

Railway Age

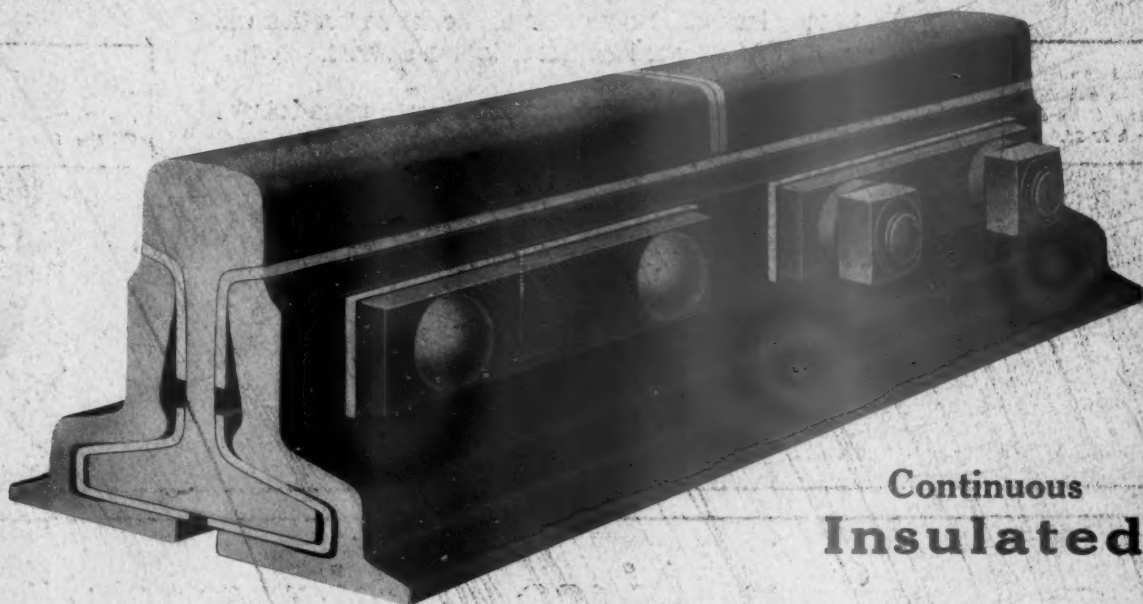
DAILY EDITION

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SIXTY-FOURTH YEAR

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EDITORIAL

Railway Age

DAILY EDITION

The twentieth annual convention of the American Railway Engineering Association promises to be the most successful meeting ever held by this association. One indication of this is the record attendance for the first day as evidenced by a registration of 368 members and 125 guests, and

Record for Convention Attendance

a capacity crowd in the Florentine room during most of the committee reports. The fact that so many more railway men are present this year is explained in part by the serious obstacles in the way of attendance at the two preceding conventions. Last year war conditions, war improvements and war labor shortages kept many at home. The year previous, the prospect of a nation-wide railroad strike had a like influence. However, no little credit for the presence of larger numbers is due to the Railroad Administration in encouraging attendance at the meeting and inspection of the supply exhibit.

One unfortunate circumstance introduced by the large attendance at the meetings is the bearing it has on the unsatisfactory acoustics of the convention hall. Knowing the faults of the room, seasoned members have discovered the portions of the hall in which the difficulty is least pronounced. But when it is filled nearly to capacity the auditor has no choice in the matter—he must take a seat where he finds it, which may or may not be in one of the “dead spots.” Just what the solution is, cannot be determined without some study. A change in the arrangement of the seating or the position of the rostrum from the side to the end of the room might improve matters. One thing is certain, however, the speakers, presiding officers, committee chairman, and others should pay more attention to their manner of speaking. Engineers as a rule are not orators, but they might try harder to make up for their shortcomings in this regard. This is one problem resulting from the growth of the association and as such it should be recognized.

A Problem in Acoustics

C. A. Morse touched upon an important point in his presidential address yesterday morning when he referred to the importance of co-operation with the manufacturers in the development of standard designs for maintenance of way materials. This subject received further emphasis in the discussion of the report of the track committee yesterday afternoon when that committee presented designs for switches and frogs which had also received the approval of committees and manufacturers. The preliminary purpose in the preparation of designs of this character is, of course, to develop those plans which will best meet the demands made on them. If these plans can at the same time be made so as to afford maximum economy of production in the plants of the manufacturers, this is to the mutual advantage of the railways and the

Cooperation With Manufacturers

makers. Engineers have too often been prone in the past to disregard shop problems in preparing their designs, with the result that their work has been needlessly expensive. If unit costs can be reduced without sacrificing quality this should by all means be done. Other committees of the association can well afford to follow the practice of the track committee in this respect.

The results of the instructions issued by officials of the Railroad Administration to federal managers to have as many of their engineering and maintenance of way officers as could be spared from their usual duties to attend the conventions and visit the exhibit this week were very apparent, both in the convention hall and at the Coliseum yesterday. The attendance at the sessions of the American Railway Engineering Association crowded the room throughout the day. At the Coliseum there were more railway officers inspecting the exhibit than probably ever was the case in any past year. Furthermore, it was evident that the railway men took a keener interest in the convention proceedings and in the exhibit than they probably ever did before. The large attendance is due not only to the support given by the Railroad Administration, but also to the fact that the amount of work being done by the engineering and maintenance of way departments is unusually small at this time. The best time for railway officers to attend conventions and examine railway appliances is when the demands on their time at home are the least, and the ultimate outcome cannot fail to be an increase in the efficiency with engineering, and maintenance work will be handled when more of such work is to be done.

One of the chief benefits to be derived from the preparation of statistical records is that they provide the measuring stick for determining progress. They afford the best means which a department head can utilize in keeping in touch with affairs throughout his entire organization. And they go farther. They enable him, by comparison, to determine accurately the actual state of his organization and to ascertain whether it is progressing or standing still. In fact, it is rapidly becoming recognized that without proper regard for records and accounts a commercial concern cannot prosper. In consequence the old corner grocery methods are a thing of the past. The railroads are no exception to this rule and in their case they have a right to look to the A. R. E. A. for guidance in the matter of standard methods as well as standard forms. In consequence of the new conditions now obtaining in railroad matters as a result of which it is essential to know definitely just what is entering into the property, in both labor and materials, it seems that the development of the best means for the collection and tabulation of information, particularly insofar as the engineering departments of the railways are concerned, is the most important work

An Important Assignment

with which the Committee of Records and Accounts is faced.

Development of Unified Standards

IN the past the idea has generally prevailed among engineers that one of the chief requisites of any engineer was the ability to design. There is no question as to the importance of such ability, but in living up to what has been the ideal the practical side of their work has been in a degree lost sight of by the designers. In railway work this has led to a multiplicity of designs for similar articles and the placing of an undue burden on the manufacturer who must, in furnishing supplies, make the necessary provision in the equipment of his plant to meet the requirements of the various designs. To the manufacturer this practice results in large sums being tied up in equipment which is idle for long periods of time with consequent increased costs of production. The railroads in purchasing supplies, are required to absorb these increased costs in the purchase prices. From any angle the practice is wasteful. While new designs are, of course, encouraged by the American Railway Engineering Association, it goes further. It furnishes the means for unifying design while yet allowing for modifications that constitute real improvements. The development of these unified designs is important both to the railways and the manufacturers and the Association should have the best co-operation of both in their development.

A Service for the Young Man

ONE OF THE DISTINCTIVE signs of the times is the increased consideration given by the various associations of professional and technical men to the welfare of the younger men. A large part of this has been directed to what might be termed material considerations—wages, working conditions, etc., subjects which have been of special interest during the last year or more because the advances in compensation accorded to the great mass of labor have necessarily exerted an influence on conditions in the lower ranks of the technical forces on the railroads.

However, there are other phases of this subject than those involving compensation and employment. The leaders in the professions are charged with certain responsibilities to the younger men in matters of technical attainment. In conformity with this thought, some associations have provided for junior memberships in order that the men in subordinate positions may derive certain of the benefits of memberships without need of any reduction in the qualifications for entrance for the corporate member. Thus the organization can perform a real service without detracting in any way from its high standards of personnel.

Are there no opportunities for the American Railway Engineering Association along these lines? Since its activities are limited to those of a technical association, it must be generally conceded that the matters of material welfare are rather outside of its province, although the development of studies in the economics of labor might lead eventually to that end. For the present, however, it would seem that the association could be of real help to the younger men from the educational standpoint. The high regard with which the work of the association is held by the outsider is demonstrated by the extended use recently made of the Manual by the federal government. The proceedings and bulletins are also standard works of reference.

This raises the question as to the possibility of providing some form of subordinate, limited qualification, mem-

bership that would enable the men in the ranks to receive the publications. The advantages accruing from this arrangement would be limited by no means to the men themselves, for the railroads would also derive benefits through the wider dissemination of the best practices. Supplemental to the wider use of the publications, it might be feasible to encourage attendance at the meetings, an arrangement that would be of further benefit to the subordinate technical men through the inspiration of contact with the leaders in their chosen branch of railway service.

A Wise Decision

THE AMERICAN RAILWAY ENGINEERING ASSOCIATION is to be congratulated on the wisdom and ability displayed by its officers during the past year in their negotiations relative to the amalgamation of the leading railway technical societies into one composite organization. As the matter was originally presented by the American Railway Association, an organization of railway executives, it required courage for the officers of the engineering association to stand out for what they thought was best, contrary to the suggestions of their superiors. The spirited discussion at the meeting of the Railway Signal Association on Monday showed the resentment which many members of that association bear to the amalgamation even after that society has consented to the plan. Similar opposition has also been evidenced among some of the members of other organizations involved.

The amalgamated organization has possibilities for constructive work beyond those possessed by any of the individual organizations. At the same time it remains for that association to demonstrate that it will utilize these opportunities. The associations which have been invited to amalgamate have long records of constructive work behind them. The record of the American Railroad Association which fathers the new arrangement is not so favorable. Furthermore, as we have pointed out previously in these columns, the very nature of the amalgamation, including the official character of its management and of its conclusions, will naturally result in a certain loss of freedom in expression and in action which will detract from the value of the work done.

The arrangement which the American Railway Engineering Association suggested last spring and which it has been able to effect with the American Railroad Association, whereby harmony of action is assured while the engineering association retains its individual identity and initiative has much to commend it. After all, the value of association work is measured by the work of its individual members and this is promoted in a large measure by professional pride and interest rather than from direct assignment as a routine duty. The result of the two-fold experiment which is now being inaugurated—complete amalgamation in some instances and co-ordination and co-operation in the engineering section—will be watched with much interest.

Record-Breaking Attendance at Coliseum

The attendance at the National Railway Appliances exhibit yesterday broke all records for a single day's gathering at this exhibit. Over 6,000 railway men visited the display yesterday as compared with approximately 4,900 on the same day one year ago. Among the visitors yesterday were a number of foreign railway representatives, including men from Japan, France and Dutch East Indies. This large attendance was recorded in spite of an unusually large attendance at the convention.

Mr. Hooley on Engineers

With apologies to Dunne (F. P.) and Dunn (S. O.)

"D'ye mind me tillin' ye, Dinnessey, 'twas some years ago, about th' engineers that has a convintion ivery year at th' Congress Hotel?" asked Mr. Hooley last evening when Dinnessey, as usual, came into his place to see if there was anyone standing around who was likely to loosen.

"I mind ye sid somet'ing about th' min that run th' thrains, 'nd that as they were gittin' more pay thin anny other relrod imployay they was goin' t' try to get more pay thin th' orficers av the road. D'ye mean that time?" inquired Dinnessey, with only a mild show of interest.

"Ye're incapacity f'r takin' in th' manin' av me remarks putts ye in one class by ye'rself," rejoined Mr. Hooley. "Ye'r thinkin' about th' min what drives th' injines, 'nd I'm talkin' about th' min that build th' thracks what th' injines runs on."

"I told ye thin that whin I'm talkin' about th' injineers that's holdin' a convintion at th' Congress, I'm manin' th' min that me old frind Jerry Sullivan called th' aljaybray min. Thim's th' wans that figure out on paper what th' min what do th' work's got to do. They lay out th' thracks, 'nd th' stations, 'nd th' switches, 'nd th' side thracks, 'nd th' bridges, 'nd kape watch av thim t' say that they're fit f'r t' run thrains over."

"I had a frind wance, I mind me now, what they called a siction boss, 'nd another what walked th' thracks by night," interrupted Mr. Dinnessey, brightening up as he thought he had caught his friend's meaning.

"O, Dinnessey, Dinnessey, wull ye niver learn anything afther arl me indeavors t' insthruet ye? I towld ye, 'twas tin years ago, in riference t' these same min how they laid out th' thracks 'nd built th' tunnels, 'nd I made ye an illustration av a tunnel through th' Rocky Mountains where f'r that th' injineer'd miscalculated, th' tunnel—th' hole through th' mountain—was made too long 'nd shtuck out av th' mountain at both inds. Th' injineer av that road covered up his mistake by buildin' snowshids over th' ind av th' hole where it shtuck out. T' make mistakes 's human, Dinnessey, but t' know how t' kiver 'em up requires spicial talent 'nd take-a-nickel ijication."

"Th' injineers 's arl ijicated min, Dinnessey, 'nd ye c'n say they're human by th' number av thim that's bin in th' milit'ry service these last years. They're human 'nd they're ijicated, 'nd what's more, they're pathriotic. The prisidint av this association what's holdin' th' convintion 's bin in th' service av his counthry directin' th' operation av th' relrods av th' counthry, 'nd he's made good at it, too. He's bin in charge av th' maintenance av the relrods 'nd th' injineering av arl av thim. 'Nd th' rigimints that wint t' France f'r t' build th' roads there. Thim was brave min, Dinnessey, 'nd was arlways a little ahid av th' front line."

"But what's arl this got to do wit' th' convintion that's on at th' Congress?" inquired Dinnessey, yawning.

"I don't know," answered Mr. Hooley.

"But 'tis these same min that's got together t' shtudy th' probloms of thrack, 'nd roadway, 'nd bridges, 'nd th' like av that. I towld ye they was human, 'nd they make mistakes, 'nd they're arl th' time corricitin' th' mistakes that's bin made by thim that's gone before, rist their sowls, whither they're did or not. Whin they get together, as now in a convintion, wan man tills av th' mis-thakes another man has made, 'nd it serves 's a warnin' t' that man t' ijicate himsilf some more so as t' learn to civer thim up, 'nd t' th' others not t' make th' same."

"Cud ye till me av some av th' other misthakes that's

bin made besides th' tunnel that shticks out bot' sides av th' mountain?" asked Dinnessey with interest.

"I cud, but I won't," answered Mr. Hooley, as he proceeded to close up the place.

Today's Program

The program for today will include the presentation of the following reports:

- Wood Preservation
- Yards and Terminals
- Electricity
- Ties
- Stresses in Railroad Track (Special)
- Buildings
- Ballast
- Roadway
- Rail

The annual dinner is scheduled in the Gold room of the Congress Hotel at 6:30 o'clock.

Prominent Speakers at Dinner Tonight

The annual dinner of the American Railway Engineering Association will be held in the Gold Room of the Congress Hotel tonight. The speakers will include Senator Atlee Pomerene of Ohio, Dr. George Adam, Judge Clarence N. Goodwin and Robert J. Cary.

Senator Pomerene is a member of the Senate Committee on Interstate Commerce which has conducted the recent hearings on the railroad situation. He is a close student of the railroad problem and will speak on "Some Phases of the Railroad Question." Dr. Adam is pastor of the Emmanuel Congregational Church, Montreal, Quebec, and will speak on "Language and Ideals." Mr. Goodwin was formerly a judge in Chicago and has made a close study of the immigrant and naturalization problems. His subject will be "Americanization in Connection With Maintenance of Way Labor on Railroads." Mr. Cary is general counsel of the New York Central Lines at Chicago and will take for his topic "Noblesse Obligee—Our New Nationalism."

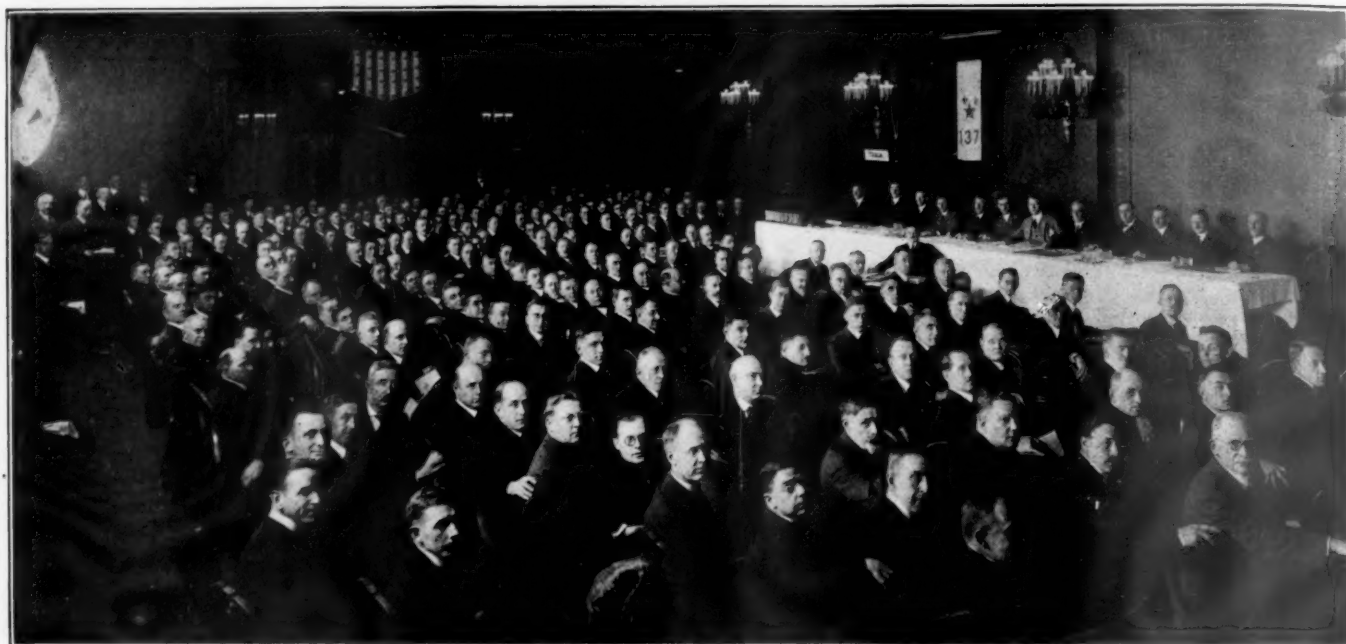
Tickets for the dinner were placed on sale in the corridor outside the convention hall yesterday noon and the rapidity with which they were taken indicated an unusually large attendance.

Wood Preservers Meet

The executive committee of the American Wood Preservers Association, which spent all day Monday in conference at the Hotel Sherman, will reconvene at noon today to conclude the business before it. The principal topic for consideration will be the change of the location and the date for the next convention, which is now scheduled to be held in Chicago the fourth week of January, 1920. Owing to the fact that the Automobile Show will be held in Chicago during the same week, difficulty is being found in arranging for satisfactory hotel accommodations.

F. J. Lepreau Resigns

Frank J. Lepreau, vice-president and general sales manager of the Primary Battery Division of Thomas A. Edison, Inc., has resigned, effective April 1. Mr. Lepreau has been connected with Thomas A. Edison, Inc., since 1909, and with the Batteries Supply Company, now a part of the Edison company, since 1905. Prior to that time he was associated with the Western Electric Company and the Stromberg-Carlson Manufacturing Company.



The American Railway Engineering Association Convention in Session

American Railway Engineering Association Proceedings

Report of Tuesday's Sessions, Including President's Address and
Abstracts of Several Committee Reports and Discussions

THE TWENTIETH ANNUAL convention of the A. R. E. A. was called to order in the Florentine Room of the Congress Hotel, at 10 o'clock yesterday morning by the president, Charles A. Morse, assistant director, Division of Operation, Engineering and Maintenance of the United States Railroad Administration. An unusually large number of men were present at the opening ses-

sion and many members and guests registered during the day. As the minutes of last year's meeting had been printed and distributed, their reading was dispensed with and the convention passed immediately to the president's address. Following this the reports of the secretary and treasurer were presented, after which the Association began the consideration of the reports of committees.

Address of President Charles A. Morse

This is the twentieth annual convention of this Association, and if we look back over the period covered by the life of the Association, and see the changes that have taken place in the physical character of the railroads of the country, we recognize that this covers a period of general reconstruction of our railroads and of maintenance methods and requirements. This has been caused by the effort upon the part of the railroads to satisfy the demands of the public for better passenger service, more prompt freight service, better station facilities and, coupled with this, greater safety to the traveling public, and to employees.

In this reconstruction the American Railway Engineering Association has played an active part. Its organization, covering as it does the whole American continent, has been able to bring together men of a great variety of experience and to put out recommendations from time to time for the guidance of those having this work to do, based upon this experience.

That its efforts have met with success is shown by the fact that its manual of recommended practice is to-day the ready reference book of all railroad engineers and maintenance officers, and during the late war was so recognized by the government, which ordered over 2,800 copies for the use of its railroad and engineer officers.

The Association now has about 1,400 active members, about 1,000 of whom are in the employ of railroads, the balance comprising ex-railroad officers, professors of engineering, consulting engineers, and engineers employed by companies manufacturing or handling railroad supplies.

We have, up to this time, only attempted to give recommended practice. If we could through some means insure the carrying out of these practices great results would be secured. The arrangement by which this Association is to work in closer connection with the American Railroad Association should assist in securing more uniform practice by the railroads which are members of that Association. It would be a great step forward if that Association would establish standards that would be compulsory instead of recommendatory.

We have only started on the work that should be done by the American Railway Engineering Association. We have the big end of it ahead of us. We are to have a report from the Track committee at this convention, giving recommendations for standard frogs and switches, which report has been approved by a committee of manufacturers. In other words, the engineer and the manufacturer have gotten together and agreed upon a plan that combines the manufacturer's point of view and that

of the user. I hope this will lead to a more extended practice of bringing the manufacturer into the conference, for it must mean greater economy in the manufacture of the articles. We, as engineers, have been too prone to make plans without reference to shop practice, the result being unnecessary cost, with nothing to show for it.

It is to be regretted that many of the larger railroads do not follow all of the recommendations of this Association, notwithstanding the fact that the engineers of these roads have taken an active part in perfecting such recommended practices. A campaign should be started to see if we cannot get our recommendations adopted by all of the railroads, and especially by those whose engineers are members of the Association.

The chief engineer, as a rule, recommends the standards for maintenance of roadway and structures, and if we can get them interested in A. R. E. A. standards it will be an easy matter to have them adopted.

In the matter of forms for reports and records in connection with maintenance of way and structures, there is at present no uniformity of practice among the different railroads. Our committee on Records and Accounts has prepared certain forms for recording maintenance of way information, some are used by some railroads, but I doubt if they are all used on any railroad. I have had occasion during the past six months to try and secure various maintenance of way information from the railroads, and have been surprised at the lack of such information in shape to be furnished readily by the majority of the roads. Upon looking into the matter I have found that the rules of accounting as issued by the Interstate Commerce Commission were prepared from an accountant's point of view, and they evidently consulted no one familiar with maintenance of way matters, the result being that they stop in their instructions before they get down to enough detail to insure such uniformity as will give a proper comparison between different railroads of the various items that would be of great value in analyzing maintenance expenditures. A study of this matter should be made by our committee and forms and instructions compiled that will give such information. Much has been printed regarding details of cost of maintenance of equipment, and costs are fairly well known for certain items; but when we get below the cost per mile for maintenance of way we find nothing, and when we see the variation in accounting details we realize that the figures given out of cost of maintenance per mile are absolutely valueless for comparison as between railroads. With the maintenance of way and structures costing from 14 per cent to 20 per cent of the total cost of operation, there should be such records kept as will permit of greater study of detailed costs.

Of the information now called for by the Interstate Commerce Commission, little or no use is made, it is not even tabulated, and if one wants to use any of it, he has to go to the individual railroad reports filed in their office and dig it out, one railroad at a time. There should be some one in the employ of the commission to handle this information, who knows something about maintenance matters, and who could say what information

should be secured and who could properly analyze the information and tabulate it for the use of the railroads.

Our committee is best qualified to handle this matter properly, and when it has reached its conclusions we should ask the Interstate Commerce Commission to add to its instructions, so as to give the results that the committee on Records and Accounts decide desirable.

With the increase in the cost of labor there must be an awakening on the subject of maintenance methods. There should be a carefully worked out maintenance program prepared by every railroad, and followed, instead of the haphazard manner in which it is handled at this time.

There are many things in the way of talk of uniformity in practices of railroads that should be corrected, and one of these is the rail section. The subject of a properly designed rail section has been a live one for 30 years, it having been the subject of a study and report of a committee of the American Society of Civil Engineers, later of a committee of the American Railroad Association, and it has been a subject of special study by the Rail committee of this Association for the past ten years.

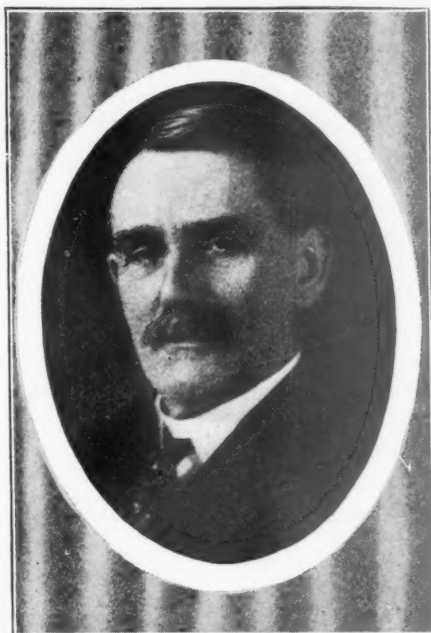
Recommendations were made to, and approved by, the American Railway Association about two years ago for but seven sections between the weights of 70 lb. and 130 lb. per yard, and yet there are being ordered and rolled to-day about 50 different sections of rail between these weights and there are 12 different sections of 100-lb. rail being rolled.

There is another practice that is, if anything, more absurd and unnecessary than the variety in rail sections; that is the variation in drilling of rail. We should all make an effort to get the drilling recommended by this Association adopted by the railroad with which we are connected. The Rail committee has been investigating the vertical location this year. The spacing longitudinally was recommended several years ago. Variation in drilling of rails also affects the joints, making it necessary to have joints drilled differently for each railroad's needs and thus requiring them to be made to order. With standard rail sections and uniform drilling, joints

could be carried in stock by the manufacturer and supplied as required, thus permitting them to be manufactured in bulk at odd times the same as other standard shapes.

The events of the past four years have brought about another change that will be far-reaching and will affect the engineer and his work. The gathering together of nearly four million soldiers from all stations in life, and the fact that, when these men were put in uniform and trained for soldiers, it was not a question of education, family connections or financial conditions that counted, but the *man*, and when it was shown that there were equally good men measured by courage and manliness developed from one class as another, it opened the eyes of all to the fact that, measured by the standard of red blood and physical ability, class disappeared, with the result that they will all return with greater respect for mankind.

The very fact that, when clothed, housed and fed alike, they produced the same results is proof that if paid fair



C. A. Morse
President of the A. R. E. A.

wages, furnished with proper living quarters and surroundings, including good food, properly cooked and served, they will be equally good citizens. Environment is what gives a man or takes from him his self-respect. When he loses his self-respect he loses his ambition, and with that gone he becomes only a machine.

President Beatty of the Canadian Pacific, in a talk to a class of student apprentices, recently stated that a man from his head down was worth \$2.50 per day, and whatever more he was worth depended upon what he had in his head. Self-respect is one of the things that is located in a man's head and makes him ambitious and takes him out of the mere machine class. Many of these men are handicapped by not being able to read the English language and having little or no education in any language. There is a popular movement under way to arrange night schools for these men, whereby they may improve themselves. It is felt that if they can be provided comfortable quarters, where they can keep clean and have a place to read or amuse themselves after work, that many will gladly take the opportunity if offered them.

This is a part of what is known as the Americanization scheme, and as so large a proportion of the floating labor element is employed on public works, and as to-day the engineer is the one who plans all of the large industrial plants, this problem of Americanization of foreign laborers is being checked up to the engineers.

We have made some advances during the past two or three years toward improving this situation on the railroads. We must go at it on a much larger scale, not from a humanitarian point of view only, but from a business point of view. The high wage has come to stay, and it should be the aim of every one to try and give as much for the high wage as can be given. Whatever is given cheerfully is, as a rule, a benefit to the giver rather than an injury. What we must try to do is to improve the surroundings, the frame of mind and the physical condition of the worker, so that he gives in increased efficiency, because he wants to do so and because he is interested in the work he is doing.

Reports of the Secretary and Treasurer

The following report on the general affairs of the Association for the past year is respectfully submitted:

Number of members last annual report.....	1,387
Admitted during the year.....	97
Deceased	13
Withdrawals	22
	— 35
	62

Total membership	1,449
Members in military service.....	137

By reference to the financial statement it will be noted that the total receipts during the calendar year ending December 31, 1918, were \$37,540.88; disbursements, \$31,176.17; excess of receipts over disbursements, \$6,364.71. The dues of members in military service were remitted by the Board of Direction to the amount of \$1,739. The association has participated in the various war loans to the extent of \$12,000—\$11,000 being invested in United States Liberty Loans and \$1,000 in the Canadian Victory Loan.

The usual number of bulletins and the annual volume of the proceedings were issued during the year. The demand for the various publications of the association shows a gratifying increase. It is especially gratifying to record that the war department of the United States Government during the year purchased 2,818 copies of the Manual of the Association for the use of the United

States Army. A liberal discount was given the government on this large order.

Financial Statement for Calendar Year Ending December 31, 1918

Balance on hand January 1, 1918\$30,894.48

Receipts

Membership Account—	
Entrance fees	\$ 530.00
Dues	6,694.50
Subscription to bulletin.....	6,694.50
Binding Proceedings and Manual.....	707.31
Badges	26.00
Sales of Publications—	
Proceedings	1,089.20
Bulletins	724.75
Manual	8,665.83
Specifications	88.55
Leaflets	44.20
General Index	1,286.75
Advertising—	
Publications	2,281.00
Interest Account—	
Investments	1,601.01
Bank balance	98.04
Annual Meeting—	
Sales of dinner tickets.....	786.00
Miscellaneous	266.09
American Railway Association—	
Rail Committee	5,957.15
Total	\$37,540.88

Disbursements

Salaries	\$ 6,038.00
Proceedings	4,830.54
Bulletins	6,983.97
Manual	1,728.55
General Index	26.00
Miscellaneous stationery and printing.....	473.15
Rents	1,165.01
Light	26.10
Telephone and Telegrams.....	125.27
Equipment	25.80
Supplies	286.69
Expressage	438.32
Postage	904.27
Exchange	47.11
Taxes	18.45
Committee expenses	100.00
Annual Meeting expenses.....	1,108.95
Audit	100.00
Refund of dues account military service, etc.	324.00
War work campaign contribution	250.00
Miscellaneous	175.69
Rail Committee	6,000.30

Total\$31,176.17
Excess of Receipts over Disbursements.....\$ 6,364.71

Balance on hand, December 31, 1918.....\$37,259.19

Consisting of:

Bonds	\$35,065.65
Cash in S. T. & S. Bank.....	2,168.54
Petty cash in Secretary's office...	25.00

\$37,259.19

Stresses in Track Fund

Balance on hand, January 1, 1918.....	\$2,688.97
Received from interest during 1918.....	58.42
	\$2,747.39

Disbursements

Salaries	\$1,055.47
Transportation	48.33
Hotel and meals.....	85.30
Telephone and telegrams.....	3.00
Supplies	77.59
Postage	10.00
Expressage	6.35
	1,286.04
Balance on hand in Standard Trust & Savings Bank, December 31, 1918.....	\$1,461.35

Report of the Treasurer

Balance on hand, January 1, 1918.....\$30,894.48
 Receipts during 1918.....\$37,540.88
 Paid out on audited vouchers during 1918.. 31,176.17

Excess of Receipts over Disbursements..... 6,364.71

Balance on hand, December 31, 1918.....\$37,259.19

Consisting of:

Bonds\$35,065.65
 Cash in S. T. & S. Bank..... 2,168.54
 Petty cash in Secretary's office.... 25.00

\$37,259.19

Stresses in Track Fund

Balance on hand, January 1, 1918.....\$2,688.97
 Received from interest during 1918..... 58.42

Total\$2,747.39

Paid out on audited vouchers during 1918..... 1,286.04

Balance on hand, December 31, 1918.....\$1,461.35

The securities listed above are in a safety deposit box of the Merchants' Loan & Trust Safe Deposit Company, Chicago.

Respectfully submitted,
 GEO. H. BREMNER, Treasurer.

GENERAL BALANCE SHEET

December 31, 1918

Assets

	1918.	1917.
Due from members.....	\$ 2,495.35	\$ 2,817.85
Due from sales of publications.....	1,823.94	1,421.17
Due from advertising.....	400.00	440.00
Due from A. R. A. (rail committee)....	470.98	431.66
Furniture and fixtures (cost).....	997.40	997.40
Gold badges	51.00	67.50
Publications on hand (estimated).....	6,000.00	6,000.00
Extensometers	500.00	500.00
Investments	35,065.65	29,065.65
Interest on investments (accrued).....	711.96	828.15
Cash in Standard Trust & Savings Bank	2,168.54	1,803.83
Petty cash fund.....	25.00	25.00
Total	\$50,709.82	\$44,398.21

Liabilities

Members' dues paid in advance.....	\$ 2,053.50	\$ 1,371.50
Impact test fund on electrified railways..	285.46	285.46
Advertising paid in advance.....	120.00	75.00
Surplus	48,250.86	42,666.25
Total	\$50,709.82	\$44,398.21

Report on Records and Accounts

The committee reports progress on the subject of Cost-Keeping Methods and Statistical Records. During the year the committee has received from the Bureau of Railway Economics and leading publishing houses information on the subject of cost-keeping methods as applying to railroads. In reply to a circular letter, sent to the different railroads on this subject, 35 answers were received, of which one-third were accompanied with information in the nature of blank forms used in accounting records; another third indicated interest in the subject, and the remaining third stated their records were kept in accordance with the I. C. C. classification.

In view of the changes taking place in the railroad situation during the past year—and we are still in the midst of this transition period—the committee suggests that this and all other subjects except that on the use of small cardboard or other suitable material for field men be re-assigned to it for the coming year.

Committee: W. A. Christian (I. C. C.), chairman; M. C. Byers (W. M.), vice-chairman; F. L. Beal (L. & A.), Lester Bernstein (B. & O.), H. Bortin (Cons. Eng.), J. W. Fox (C. of Ga.), B. B. Harris, R. C. Sattley (C. R. I. & P.), H. M. Stout (N. P.), G. D. Hill (N. Y. C.), G. T. Kuntz (U. P.), Henry Lehn (N. Y. C.), J. H. Milburn (B. & O.), J. C. Patterson (Erie), Huntington Smith (N. Y. C. & St. L.), W. D. Wiggins (Pa. Lines).

Discussion

Mr. Christian (Chairman): It will not be worth while for me to read all of these, because I wish to submit this report as one of progress only. I move that this be accepted as a report of progress only.

J. L. Campbell (E. P. S. W.): Before that motion is put, perhaps it would be proper to say just at this time, particularly within the last year, some new questions have arisen in connection with this matter of accounting, brought about primarily by the relations that exist between the railways and the government. In the agreement by which the government took over the railways there was a provision that the roads should be returned in as good condition as they were received. It developed immediately that the relative conditions of the roads in the two periods could not very well be measured in terms

of dollars and cents on account of the great change in the unit prices for labor and material. It may be well for this committee to consider some form of reporting units of material and units of labor going into the property. They will always be exact measures of what is being done with the property, as far as the record covering these two points is concerned.

R. C. Sattley (C. R. I. & P.): There are a good many railroads that are trying to get out of furnishing this to the Interstate Commerce Commission.

W. H. Courtenay (L. & N.): As to keeping a record of ballast, I took occasion some twenty years ago to ascertain how much ballast there was on a line of railroad completed in 1868. The L. & N. had kept very good accounts, that were instituted originally by the late Albert Fink, showing the quantities of materials used and the various expenditures. By merely ascertaining the amount of ballast purchased for this operating division I ascertained it was sufficient to provide a four-foot depth of ballast under the ties for the whole length of the division. I had known that division since 1879, and to my certain knowledge there had never been at any time sufficient ballast put under the ties.

It is impossible to tell how much effective ballast you have at any one time on railroads such as ours. Ballast is lost—it becomes dissipated—and to maintain a division properly you must have it ballasted every year, and every time the track is resurfaced a certain amount of ballasting is required.

It is impossible for the railroads to give you the complete details about the ballast. It cannot be done. I say that with a good deal of emphasis, because I know. In the first place, if you have all these reports, you have to rely on them, primarily, on the unfortunate section foreman, who must act as the original bookkeeper. I hope this matter of getting detail statistics, particularly with a view to determining whether the U. S. R. A. maintains the track as well as the corporation did in the three test years ending June 30, 1917, can be reached in some practicable way. There can be a great deal said on that subject.

The President: I have been through about the same thing. As you were telling about the four feet of ballast I was wondering how many inches of leather we would have on our shoes if we added all that we had worn out in our lifetimes. This ballast is worn out, and, according to my notion we have to decide on a certain depth of standard ballast—the Pennsylvania Lines have decided on 24 in. This you may say is an arbitrary proposition, and no one has any right to do that, but there are many arbitrary things which are necessary, and if you are going to get comparisons you must have some arbitrary rules, and have the comparisons conform to these rules, instead of having 50 or 100 different standards of comparison. My thought is that you must get figures in some certain way in order to make comparisons. In regard to Mr. Sattley's remarks, I have received profiles for 230,000 miles of road, and I found it

would take me 230,000 years to go over that and dig out the information.

R. H. Ford (C. R. I. & P.): I think the greatest benefit of the work of this association would accrue to this country if we could get rid of a lot of records and accounts now being prepared by our maintenance people. I have been impressed with the tremendous number of useless accounts that are being promulgated. It seems to me if the committee would devote its attention to a simplification of accounts and records that seem to have been gradually accumulating on railroads for many years they could do more real benefit than specifying some particular form of accounting or what some particular item of accounting means.

(The motion made by the chairman of the committee was then put to vote and carried and the committee dismissed with thanks.)

Report on Signals and Interlocking



REPORT was submitted by the committee on the following subjects:

2. The problem of signaling railroads with reference to the effect of signaling and the proper location of passing sidings on the capacity of the line.

3. The specifications adopted by the Railway Signal Association which warrant endorsement, conferring with Committees 5, 6, 15, or other appropriate committees, on appliances affecting track or structures.

4. The desirability of providing in connection with an automatic signal system: (a) An overlap. (b) Approach restricting speed indications.

5. The various types of light signals for day and night indications.

8. Automatic train control.

Progress reports were submitted on other subjects which had been assigned the committee.

Under item (2) the committee submitted its report in three parts. In the report of 1917 it stated that "our work on this subject will be in applying and testing formulas and methods on pieces of road with actual movements of trains."

In accordance with the above statement the committee submitted a report on a single track railroad (published on page 598 of March 19, 1918, issue of the *Railway Age*). Further work was done in the development of a method of analysis of two or more track railroads, and this method was tested on a piece of railroad (see March 17, 1919, issue of the *Railway Age*). Recommendations of the committee are given under the heading of conclusions.

Under item (3) the committee submitted a list of matters acted upon at the Railway Signal Association convention in 1918 and adopted by letter-ballot. Recommendations on this subject are given under the heading of conclusions.

Under item (4) the committee reported as follows:

(a) Overlaps are not desirable for following movements, as adequate advance information can be provided in the signal system.

(b) Overlaps are necessary for opposing movements where adequate advance information cannot otherwise be provided.

The action recommended will be found under the heading of conclusions.

In Appendix C the committee submitted a report on item (5) and recommendations on this subject are given under the heading of conclusions.

Item (8) on automatic train control is covered in Appendix D, while recommendations are given under the heading of conclusions.

Conclusions

The committee recommended that the report on subject 2 be accepted as information.

That the list of Railway Signal Association specifications and standards submitted by this committee in its report in 1918 be published in the Manual as supplementary to the list heretofore inserted for the information of the members. Also that the submitted list of Railway Signal Association specifications and standards published in Appendix B be published in the Manual as supplementary to the list heretofore submitted or inserted for information of the members.

That the report on subject 4 be adopted and published in the Manual.

That the report on subject 5 submitted in Appendix C be accepted as information.

That the report on subject 8 given in Appendix D be accepted as information.

Committee: J. A. Peabody (C. & N. W.), chairman; W. J. Eck (Sou.), vice-chairman; Azel Ames, C. C. Anthony, H. E. Astley (N. Y. N. H. & H.), H. S. Balliet (N. Y. C.), A. M. Burt (N. P.), C. A. Christofferson (N. P.), C. E. Denney (N. Y. C. & St. L.), F. L. Dodgson, C. A. Dunham (G. N.), W. H. Elliott (N. Y. C.), G. E. Ellis (I. C. C.), Paul Jones (Penna. Lines), J. R. Leighty (M. P.), J. G. M. Leisenring (I. T. S.), H. K. Lowry (C. R. I. & P.), J. C. Mock (M. C.), F. P. Patentall (B. & O.), A. H. Rudd (P. R. R.), C. L. Rupert (C. R. I. & P.), Mott Sawyer (C. M. & St. P.), W. B. Scott (S. P.), A. G. Shaver (Cons. Engr.), Thos. S. Stevens (A. T. & S. F.), W. M. Vandersluis (I. C.), B. Wheelwright (G. T.), R. E. Woodruff (Erie).

Appendix C—Light Signals for Day Indications

For the purpose of this report, the following definitions apply:

1. Position light signal: A signal on which the various indications are given by positions of white lights.

2. Color light signal: A signal on which indications are given by colored lights only.

3. Position color light signals: Signals on which the indications are given by the position and color of lights. The report covered color-light and position-light signals for day and night use.

Three types of light signals have been designed to meet the requirements of railroads and traction lines satisfactorily and economically.

(1) A long-range signal for high speed traffic. This requires a concentrated light source, very efficient lenses and considerable care in installation and alignment.

(2) The majority of traction lines and interurban railways can use a light-signal of medium range, relatively inexpensive construction and having considerable spread to projected beam.

(3) There is another class of signaling where very short ranges are required, and where medium size and expense is the deciding factor.

In referring to these signals they were designated as long-range, medium-range, and short-range.

In broad daylight, under unfavorable sun and background conditions, there are two alternatives open for the light source for long-range signals. Either a very high wattage lamp must be used, or a lower wattage with a concentrated and accurately located filament. The long-range signal has a very small beam spread, on account of the concentrated filament employed. Consequently, these signals have been designed to facilitate accurate alignment by providing separate horizontal and vertical adjustments.

Colored Light Signals

For long-range signals it has been found advisable, in order to increase efficiency and reduce the size of signals, to employ a double lens, by which means a large angle of the spherical candlepower of the lamp is intercepted. The outer lens used at present varies from 8 $\frac{3}{8}$ in. to 10 in. For medium-range signals the double lens is still employed to secure high efficiency, but standard lamps are used. The construction is relatively simple, as no accurate location of filament has to be provided. For short-range signals, to reduce cost, the double lens is omitted and a small lens, usually 5 $\frac{3}{8}$ in. in diameter, has been substituted. In practice a 40-watt lamp with filaments of different resistance, so that one will burn out before the other, or two 25-watt lamps in multiple, are used. If fixed lights are used, so as to locate the signal if the active light is extinguished, the second lamp might be dispensed with but would be used in the fixed light. In any event, on account of the colors cutting down the range, 35 to 50 watts per light are required.

Position Light Signals

Only two ranges are provided: Long range, 4,000 to 5,000 ft. for high signals, and short range, 1,000 ft. more or less, for dwarf signals.

As colors are eliminated, the effective range per candlepower at the lamp is greatly increased, but special provisions have to be made for elimination of sun reflection and phantom lights; this is taken care of by special conical cover glasses, arrangement of reflectors and treatment of the inverted toric lenses, and by use and position of the spherical lamp bulb.

The short-range signals are not hooded, but are provided with chiffon screens and frosted cover glasses. These require two 20-watt lamps, burned under voltage, or a maximum of 34 watts per signal. Experiments are now being made with the view of using same type cover glass as the high signals and reducing the wattage per signal to 10.

The high signals are equipped with 5 $\frac{3}{8}$ -in. lenses and cover glasses, and the dwarfs with 4 in.

Conclusions

(1) Colored and position-light signals, for day and night use, by elimination of all moving parts except the control relays, reduce the number of failures.

(2) Light-signal aspects have greater visibility and range under adverse weather and background conditions than the semaphore, while the close indications compare favorably.

(3) Light signals give uniform indications at all times. Other types of signals give the indication by position in daylight, by color at night, and by both during transition periods. The various aspects of the position-light signal are equal in intensity, range and visibility.

(4) In general practice, the number of aspects of any one arm of a semaphore is limited to three. With the position-light signal, four distinctive positions may be used, while the number of indications given by colored-light signals is limited only by the colors available.

(5) Where power is available, the cost of operating light signals is less than for operating motor signals.

(6) Current consumption under normal automatic signal conditions:

Position-light signals: 45-watt lamps—20 watts.

One colored light: 35 to 50 watts.

For interlocking signals, consumption is increased depending upon the number of lights displayed, but the ratio holds.

(7) Cost of maintenance of light signals is considerably less than that of motor signals, and, as the colored-light signal has less lights to renew, it has an advantage in this respect over the position-light signal.

(8) The field for the economical use of light signals is limited, as noted above, to points where power is available. In this field the light signals have advantages over other types. The position-light signal can be installed at any location where clearance will permit the present standard semaphore to be erected. The colored-light signal can be used in more restricted clearances.

Type of Signals

There are two general types of colored light signals: (a) Indoor or tunnel type; (b) outdoor type.

The indoor type is comparatively simple, as it is used in dark or semi-light locations and only a limited range is required, hence the optical problem involved is easily solved. The outdoor type of colored light signal presents much greater difficulties from the optical standpoint, as it must give a distinctive indication under bright sunlight conditions. This must be discernible at a range of about 3,000 ft. for steam road or high speed interurban electric service. The indoor type of signal units are made up in 2 or 3-lens units to give the aspects required for two-position or three-position signaling. A two-arm signal is obtained by combining two 3-lens units.

There are two classes of outdoor type of signal units:

(a) Long-range class—3,000 ft. range; (b) short-range class—1,000 ft. range.

The short-range class uses the same cast-iron case as the indoor or tunnel signal, but has a special lens arrangement known as the doublet lens combination and requires higher wattage lamps than the indoor signal.

The long-range signal has larger doublet lenses than the short-range signal and takes a larger size and larger wattage incandescent lamp.

The short-range class of outdoor colored light signal unit comprises two lenses, one mounted behind and close to the other. This is known as a doublet lens combination. The outer doublet lens receives the light from the inner doublet and refracts it so as to give parallel rays, as the rays of light from the inner doublet lens are not parallel.

In the long-range class of outdoor type of colored light signal unit doublet lenses are employed. The outer doublet lens is $8\frac{3}{8}$ in. in diameter and 4-in. focus, and is made of clear glass. The inner doublet lens is $5\frac{1}{2}$ in. in diameter and has a focal length of $\frac{1}{2}$ in. The color is as specified. The outer doublet lens can be furnished of half toric design if increased spread in one direction is required.

In the installation of colored light signals:

(a) Large numbers of indoor and short-range outdoor colored light signals have been furnished to the New York Municipal Railways.

(b) Long-range outdoor colored light signals have been furnished to the Chicago, Milwaukee & St. Paul for use on its electrified divisions, and to a number of high-speed interurban trolley lines in Indiana. Colored light signals have not been used to any extent on steam roads, being required by trolley lines or electrified steam roads where alternating current power and power transmission lines are usually available.

Appendix D. Automatic Train Control

The following data in regard to classification of devices and reports of official tests made by the Block Signal and Train Control Board and by the Bureau of Safety, Interstate Commerce Commission of train control devices, was given as information. The train control devices that have been tested and those that have been developed to the extent that models have been made or patents issued may be divided into the following classes or type:

1. Mechanical trip.
2. Electric contact rail.
3. Insulated track rail.
4. Magnetic inductive.
5. Inductive.
6. Hertzian wave or wireless.

Devices Tested

ROWELL-POTTER SAFETY STOP.—This included an automatic signal system, with signals operated by power stored by a passing train, and a mechanically operated train stop, tested on the C., B. & Q.

HARRINGTON TRAIN CONTROL AND ALARM.—An overhead mechanical trip, and audible cab signal, tested on the Erie.

LACROIX TRAIN CONTROL SYSTEM.—An automatic stop and cab signal system of the intermittent contact rail type, tested on the Staten Island Rapid Transit Railway.

WARTHEN CAB SIGNAL AND TRAIN CONTROL SYSTEM.—A cab signal and automatic train stop of the intermittent overhead contact type, tested on the B., R. & P.

RAILWAY AUTOMATIC SAFETY APPLIANCE COMPANY.—An automatic stop device, of the mechanical trip type, controlled electrically, tested on the P. M.

JONES SIGNAL SYSTEM.—An automatic train stop of the mechanical trip type, electrically controlled, tested on the N. Y. C.

GRAY-THURBER TRAIN CONTROL SYSTEM.—An automatic train control system using a short section of insulated track and an insulated portion of the train, tested on P., Ft. W. & C.

AMERICAN TRAIN CONTROL COMPANY.—An automatic train control system of the intermittent electrical contact type, tested on the Maryland & Pennsylvania.

GOLLOS RAILWAY SIGNAL COMPANY.—An automatic train control system of the intermittent electric contact type, tested on the C., B. & Q.

WOODING TRAIN CONTROL SYSTEM.—An automatic train control system of the intermittent electric contact type, tested on the D., L. & W.

AMERICAN TRAIN CONTROL SYSTEM.—This has been installed on the C. & O. on seven miles of its single track main line between Gordonsville and Cobham, Va., and practically all the engines have been equipped that operate over that district. Plans are being made for some extension of the system. This is a ramp or intermittent contact type, and is a development of the Jones System tested by the Interstate Commerce Commission on the Maryland & Pennsylvania.

SHADLE AUTOMATIC TRAIN CONTROL.—This is a ramp or intermittent electrical contact type of train control, and was tried on the C., I. & W.

NATIONAL SAFETY APPLIANCE COMPANY.—This company has made a small installation at Oroville, Calif., on the W. P., and is of the induction type.

SCHWEYER AUTOMATIC TRAIN CONTROL.—This system is an induction scheme on rather a different principle from the other schemes of this nature which have been proposed.

Discussion

J. A. Peabody (Chairman): It is recommended that this matter be accepted as information. I so move.

(The motion was carried.)

(Mr. Peabody then presented Subject 3.)

Mr. Peabody: You understand that this matter which we are reporting now was submitted to this association a year ago and turned back for further consideration on the part of this association.

C. E. Lindsay (U. S. R. A.): In the interest of the committee on Outline of Work, I want to ask if any conclusions have been arrived at by the Signal Association which would modify the work for next year.

Mr. Peabody: All we submit here has been passed on and approved by letter ballot by the Signal Association. I move that the first half of this matter (as given above under "Conclusions") be approved.

(The motion was carried.)

(Mr. Peabody then read the latter portion of this matter (under "Conclusions") and moved the adoption of that portion of the report.)

A number of members objected to the fact that the plans are not available for examination so that there is not an adequate opportunity to investigate them. Others contended that the lists of drawing numbers with references to the Signal Association Manual were valuable as information and could be of greater use if published in the Manual of the A. R. E. A. than if given only in the Proceedings.

(Mr. Peabody's motion to insert the information in Appendix B in the Manual was carried.)

(Mr. Peabody then read the matter relating to Subject 4 and moved its adoption.)

H. R. Safford (U. S. R. A.): Would it not be better if the second clause of that recommendation could be expanded to contain a little more to indicate the character and conditions under which other types of advance information can be substituted for this condition? It says: "Overlaps are necessary for opposing movements, where adequate advance information cannot otherwise be provided." Is that capable of being a little more definitely specified?

J. C. Mock (M. C.): The conclusion was reached after the consideration of the problem of protecting the train with proper advance information by using a second distant signal for some special cases for double track operation. For the single track operation it is a question whether the traffic will permit of a proper advance information of approach to the home signal. We cannot always move the trains over the road as we should like to do with a single track, and the overlap is quite necessary under those conditions, and about the only place

where we feel an overlap would be justified as against approach information. The committee does not advocate the overlap. As you will understand from our conclusion, the overlap as we regard it is the distance between home signals, plus the allowance beyond the second home signal for the stopping of a train under unusual conditions where the engineer cannot see far enough ahead of him in the same direction to stop the train. In single track that would be merely the distance between two opposing home signals—it is an overrun, really, beyond the stop signal.

W. C. Cushing (P. L. W.): Is not the distant signal indication or advance signal indication sufficient for that purpose?

Mr. Mock: We think so, and ordinarily the overlap is used in single track and formerly was used very extensively in double track signaling as a matter of economy, but it is regarded as poor practice to give only home signals—a home signal means stop, and it is realized that the home signal locations were so arranged that it is physically impossible for the trains to stop on that indication. Then they permit the train to overrun and protect them from the rear home signal by the overlap, which is simply the extension beyond the usual distance between two home signals which enables the train to hold the second home signal behind the engineer for a certain distance into the next block.

Mr. Cushing: I believe a stop signal, for the proper enforcing of discipline, should be used as such. A clause like this should not be put into our Manual without very careful consideration.

(This matter seemed to result in considerable confusion of ideas, so Mr. Mock and A. G. Shaver (con. engr.) gave detailed explanations, using objects on the table to represent the trains, signals, etc. However, further difference of opinion developed and on a motion by Mr. Safford the subject was referred back to the committee.)

Mr. Peabody: Section 5, "Report on the Various Types of Light Signals for day and night indications." The report on this subject is submitted in Appendix C, and we move that this be accepted as information.

(The motion was carried.)

Mr. Peabody: "Report on automatic train control." I move that this be accepted as information.

(Motion carried.)

Mr. Lindsay: I think it would be in order for the chairman of the Block Signal and Train Control Board to make a statement as to the organization of that board, which has occurred since our last convention. The last train control board was in existence several years ago, and has been revived by the action of the United States Railroad Administration. That fact is not recorded in our proceedings.

The President: It seems to me that it is up to the committee to find out and report the fact that there is one in existence. It has just started to do some work, and that is all that could be said for it. It has simply been appointed and organized, and is starting into work along the line of proving, if possible, the practicability of automatic train control. Probably the Signal committee will be very busy before another year.

Mr. Peabody: On the other subjects the committee reports progress.

(The committee was discharged with thanks.)

Report on Economics of Railway Labor



THE COMMITTEE has considered plans and methods for organizing to obtain labor for railways and finds that under present circumstances it seems advisable to continue investigation before presenting any set plan of organization for your consideration. The committee reports progress on this subject.

The committee presents in Appendix "A" its report on the methods of equating track sections now in use.

The committee presented in Appendix "B" tentative outline plans for boarding cars and boarding houses for railway laborers, with a view to criticism before taking up detail drawings.

The committee presents in Appendix "C" a study of the problems of establishing proper relations between units of track expenditure and units per mile of line, for different classes of road for the purpose of determining a normal maintenance expense and to obtain, as far as possible, uniform conditions involving (a) separation of expenses as between road, signal and bridge and building departments; (b) the determination of the ratio of the labor cost to total cost as a progress report.

The committee presented in Appendix "D" a list of 60

labor-saving devices with short descriptions of these machines and their purposes.

Conclusions

The committee recommends:

That the report on methods of equating track sections be accepted as information and printed in the Proceedings.

That the report on methods of equating track sections be accepted as information and printed in the Proceedings.

That the report on typical plans for boarding cars and boarding houses for railway laborers be received as a progress report. (To be considered further at the next convention.)

That the study of relations of units of track expenditure to units of mile of line with view of determining a normal maintenance expense and to obtain, as far as possible, uniform conditions involving (a) separation of expenses as between road, signal and bridge and building departments; (b) the determination of the ratio of labor cost to total cost, be received as a progress report.

Committee: E. R. Lewis (D. S. S. & A.), chairman; C. H. Stein (E. R. R. of N. J.), vice-chairman; W. J. Backes (N. Y., N. H. & H.), R. A. Baldwin (C. N.), J. Q. Barlow (Cons. Engr.), A. F. Blaess (I. C.), W. M. Camp, W. R. Dawson (N. & W.), R. C. Falconer (Erie), R. H. Ford (C., R. I. & P.), W. R. Hillary (Pa. Lines), C. B. Hoyt (N. Y. C. & St. L.), W. H. Hoyt (D. M. & N.), E. D. Jackson, C. M. James (A. C. L.), C. E. Johnston (K. C. S.), A. C. Mackenzie (C. P. R.), John C. Nelson, C. A. Paquette (C., C. C. & St. L.), J. W. Pfau (N. Y. C.), H. R. Safford (U. S. R. R. A.), Lieut.-Col. H. J. Slifer.

Appendix A—Equating Track Sections

Labor constitutes the largest single item of maintenance of way expense; in fact, it is larger than all other

expenditures combined, aggregating approximately 56 per cent of all charges of this department. From its nature it is the expenditure in which there is the greatest opportunity for the display of economy and likewise the greatest danger of waste and efficiency. It would, therefore, naturally be expected that the distribution of this expenditure, aggregating over one-half million dollars a day, would be surrounded with elaborate safeguards to insure the greatest return. Yet investigation shows that the reverse is true. As a result, the allotments are commonly made on an arbitrary basis of so many men per section, with only very general consideration of the relative amounts of work to be done.

In the discussion of labor distribution the gang is the unit in the maintenance of way organization. As the larger part of the employees in this department are engaged in track maintenance and are employed in section gangs, the committee has confined its discussion to this class of work, although the general principles apply equally to other maintenance work.

In general, section limits have been established by giving each gang an equal mileage of main line with whatever auxiliary tracks come between these limits. The gangs are then allowed an equal number of men. The result is that some gangs have much more work to perform than others because of unequal mileages of side-tracks and special local conditions. With an unequal distribution of the work, it is evident that the greatest return is not being secured from the total expenditure and loss occurs.

The importance of equating sections on a more equitable basis has been recognized for years and some study has been given to its solution. As a result, certain more or less arbitrary ratios have been established on a few roads, and while perhaps crude and inaccurate, are a step in advance of the common practice.

Thus, on the New York Central two miles of side-tracks, or 15 switches, are considered equivalent to one mile of main track. Allowance is also made for special local conditions, such as soft subgrade, high rock cuts, excessive curvature, character of traffic, etc. An ordinary section is given about six equated miles of main track.

On the Southern Pacific two miles of branch lines, or four miles of sidings, are considered equivalent to one mile of main line. Sixteen switches are also considered equivalent to one mile of track of the kind in which the switches are placed. Consideration is also given to the nature of the rail, ballast, curvature, density of traffic, etc.

On the Cleveland, Cincinnati, Chicago & St. Louis track sections have been equated where the line has been double-tracked, the length of such sections being made equivalent to six miles of single track on the following basis: Second track, 85 per cent of main track; passing track, 50 per cent of main track; yard tracks in heavy terminal yards, 50 per cent; other sidetracks, 30 per cent; turnouts, each equivalent to 300 ft. of main track.

On the New York, New Haven & Hartford a mile of main track has been taken as a unit. Two miles of side-track, or 15 switches, are considered equivalent to one mile of main track. The various lines of this road have been classified between main line, secondary main line, and branches, partially on the basis of the tonnage passing over them and in part on the importance of the lines from a passenger standpoint where the tonnage alone is not sufficiently heavy to bring them into what is considered the proper class. Different allowances of men per equated track mile are made on the lines of these different classes, consideration being given to the fact that on divisions of two and four tracks the shorter distance sectionmen have to go compensating them slightly for the heavier traffic.

An equation was worked out on one division of the Michigan Central about five years ago, covering 300 miles of single main track and 500 miles of branch tracks and sidings. As the result of a 12 months' study of the actual distribution of work on this division, the following relations were established, one mile of single main track being considered as the unit:

	Per Ct.
One mile of single main track, Class "B".....	100
One mile of single branch track	65
One mile of passing track	46
One mile of yard track	32.4
One mile of industrial track.....	24
One main track turnout	3.4
One side track turnout	1.4
One railroad crossing (one track crossing only).....	3.1
One highway crossing (highway over one track).....	2.0
One mile of fence (one side)	2.7
One mile of right-of-way (100 ft. wide).....	4.2
One farm crossing (over one track only).....	0.4

On the Toledo division of the Pennsylvania Lines west of Pittsburgh, consisting almost entirely of single track, with only a small amount of second track, one mile of main track is considered equivalent to three miles of side-tracks, four miles of yard tracks, 20 main line turnouts, 40 turnouts in side and yard tracks, 25 railroad crossings, 40 public highway crossings and 60 private crossings.

The Baltimore & Ohio has given careful attention to the subject of equating track sections in connection with the development of its standard track work system, as the determination of standard performances is essential to the computation and payment of bonuses. The details of this system, including the determination of units of track work, were described in a monograph by Earl Stimson, published in the proceedings of this association for 1916.

The Grand Trunk has given careful consideration to this problem. Based upon its extended studies, the following basis has been approved for equating track forces:

2 miles of passing track	=	1 mile of main track
2½ miles all other sidings.....	=	" " " "
15 switches	=	" " " "
24 single derrails connected with tower or switch stand	=	" " " "
12 single track railway crossings.....	=	" " " "
15 single highway crossings (public roads)	=	" " " "
10 single highway crossings (city streets)	=	" " " "

Appendix B—Typical Plans for Housing Labor

The committee prepared and presented for consideration a number of tentative typical plans for housing maintenance of way labor, including bunk houses, camp cars, knockdown camps and permanent camps.

The camp car outfits are for gangs moving frequently. The question of ceiling or lining the cars will depend upon the class of labor and the locality, but the committee feels that the prevailing idea should be to make the quarters for the men comfortable and as attractive as consistent.

The knockdown portable camps are intended for use at points where large gangs will be required for a year or two, after which time they may be moved to other points. These camps may be provided with electric lights and sanitary sewage facilities where available. These features will, however, depend on the advantages and ordinances of the particular locality. In general this construction consists of building sections bolted together.

The bunk house plans do not show lockers. These can be provided, however, as shown in the plan for a permanent camp. The floors of these buildings, as well as the permanent camps, are placed about two feet above the ground for ventilation, and it is suggested that during

the winter months, if necessary, the opening be banked up with earth in order to make the building warmer.

Appendix C—Relations Between the Unit of Track Expenditure and the Unit Per Mile of Line

The necessity for a study of this kind is increasing rapidly, because standards of maintenance are constantly being more closely scrutinized and made the subject of discussion, and in the development of the entire railway problem this is getting to be a more and more important feature.

One of the roads represented on the committee has attempted a study of this subject as related to its own zone, and the committee presented an abstract of the results of that study.

In this study it was noted that:

(1) The ratio of road department expense to total maintenance of way expense varied from 76 per cent to 79.2 per cent.

(2) The ratio of bridge and building expense to total maintenance of way expense varied from 18.2 per cent to 22.5 per cent.

(3) The ratio of signal expense to total maintenance of way expense varied from 1.5 per cent to 2.6 per cent.

(4) The ratio of road department labor to total labor expense varied from 77.9 per cent to 79.1 per cent.

(5) The ratio of bridge and building department labor to total labor varied from 18.5 per cent to 19.8 per cent.

(6) The ratio of signal department labor to total labor varied from 2.2 per cent to 3.5 per cent.

(7) The ratio of road department labor to total road department expense varied from 54 per cent to 54.8 per cent.

(8) The ratio of bridge and building department labor to total bridge and building department expense varied from 46.8 per cent to 56.2 per cent.

(9) The ratio of signal department labor to total signal department expense varied from 68.2 per cent to 74.5 per cent.

These ratios, of course, are without regard to classification of line, and the figures cover the system as a whole.

The analysis extended over a three-year period during which time important and erratic increases occurred in the cost of labor and materials, and yet it is interesting to note that the relative percentages were not changed materially thereby.

Labor, of course, is the basis for all material costs, and if labor in all classes of industrial development increases in about the same ratio, and if a normal program of work is maintained, it follows that the proportions should not differ materially, but it was somewhat surprising that during the period under discussion, with all of the violent fluctuations in material costs, these relations were not vitally affected.

Of course, during the year 1918 it is quite probable that a similar analysis would establish different proportions as between labor cost and material cost because of the rather heavy increases in wages put in effect during the year in railway service, and yet it may be found that material costs followed about the same curve.

A further analysis of this data reflects a suggested method for attempting to establish a normal maintenance cost, having regard to two major conditions—first, class of road, and second, equated track units—the basic unit being one mile of main track of first-class railroad.

The railroad under consideration occupies a northern latitude and is subject to extremes of climate ranging from 20 deg. below zero to 100 deg. above zero, and embraces about 1,000 miles, which were divided into four classes, as follows:

Class A-1. Being a double track, heavy traffic density line on which the standard of maintenance provided for the laying of 100-lb. rail, and carrying a high speed passenger traffic and a heavy freight traffic with locomotives equivalent approximately to Cooper's E-50 loading.

Class A. Single track line handling similar traffic, except passenger train service was local, but engine loadings were the same. The standard of maintenance on this class of line called for the use of 90-lb. rail.

Class B. Medium light branch line, well ballasted and laid with relaying rail, and handling locomotives equivalent to about E-40.

Class C. Very light branch lines handling a limited traffic, not exceeding three or four passenger trains and three or four freight trains per day.

Certain assumptions had to be made for the purpose of equating track values, which were as follows:

One mile of main track is equivalent to 2 miles of passing track, 2½ miles sidetrack, 15 switches.

In this analysis the period under consideration was five years from 1912 to 1917, inclusive, during which period costs generally increased, but fairly stable proportions were maintained throughout the period.

Of course, this analysis does not cover other important features of the work, such as bridges and buildings, signals, etc., but any study of this kind necessarily must be progressive, and track expenditure being the larger proportion of total expenditure, logically should be taken first.

Discussion

E. R. Lewis (Chairman): Your committee was instructed first to report on plans and methods for organizing to obtain labor for railways.

Last year there were reported three resolutions which are practically accepted today as the sense of the committee upon this subject and progress is reported.

(Vice-President Stimson in the chair.)

The Chairman: I think from the manner in which the committee presents the subject of the method of equating track sections, and the fact that they have not asked for instructions to consider it for next year, that they consider the matter fully covered and closed. I think there are many of the members present here who probably have some ideas, and it might be well to get an expression from them.

W. H. Courtenay (L. & N.): It seems to me an improvement on the method suggested by the committee is to assign a given number of men to the operating division, and let the roadmaster exercise his discretion as to where they should be working. There may be one section where less men are required than another, and if the roadmaster is a good and intelligent man with discretion, do not tell him arbitrarily to put 1 or 1½ or 2 men on each mile, but give him the number of men for the whole division and let him distribute them as he pleases. It would be an intelligent solution of the problem.

Mr. Lewis: The practice of giving the roadmaster a little latitude in that matter, I think, has obtained for a good many years on many roads. Probably most of them have left it to the judgment of the roadmaster. Now, his judgment may be particularly good, or not so good, and it has been found in many instances proper results are not obtained. When the Committee on Track first started this subject, the idea was to get it reduced to a science, which I think it should and can do.

E. T. Howson (Ry. Age): I will say further in response to the point raised by Mr. Courtenay, that it was one the committee had in mind. The sub-committee working on this endeavored to assist the roadmaster by studying the effect of the various physical conditions of

his track, the number of turnouts, etc., giving him the benefit of that data, so that he could distribute this force allotted to him between the different sections to equate the number of men more nearly to the work to be performed.

Mr. Courtenay: In answer we have prepared data very similar to that given in the report.

The Chairman: While this equation given is a guide, it cannot always be followed in the distribution of the force. The actual condition of the track to be maintained is quite a vital determining feature in connection with this equation, so in addition to this factor of equivalent mileage there is what might be called "condition per cent" that ought to be considered in determining the proper distribution of the force.

C. C. Cook (B. & O.): The point brought out by Mr. Stimson is essential. There should be a condition per cent. If your condition on every section was the same to begin with, your equated mileage would be a proper basis, but that does not prevail. So in figuring up the amount of force that each section should have, it is necessary to take into account its condition. I think that it can be scientifically worked out. It only means a very close and detailed study of the actual track and structure conditions. I don't think we could establish it to the fraction of a per cent, but in working out the detail for certain conditions per cent, and taking the sum of the whole, we arrive at a better conclusion than by arbitrarily fixing a force for the roadmaster, or for each section gang. I think it is a subject that deserves more attention and detailed study.

W. M. Camp (Ry. Review): This has been a very practical question with the roadmasters for a good many years, if you look through the proceedings of the Roadmasters' Association for 30 years back. I think the roadmasters would be gratified to have these studies made through the engineering department. I don't think it is intended that they should be an exact guide in distributing men. There are a great many things in the maintenance of way department that are very useful if they can only serve as a rough guide or rule to go by.

Mr. Lewis: This is a problem that every man must work out for himself, taking into consideration the peculiar factors on his own road. Furthermore, percentages will vary to some extent from year to year. The committee has given percentages here that may be exact on some roads; on other roads they might not apply at all.

C. W. Baldrige (A. T. & S. F.): The equating of track values is something that every roadmaster ought to find by some rule other than by his own judgment, and an outline of this kind would unquestionably be a great advantage, especially to a new man.

(The report on the method of equating track sections was accepted as information. Mr. Lewis then presented the matter "Typical plans for housing labor.")

J. L. Campbell (E. P. & S. W.): This phase of the subject suggests an element of the problem that lies somewhat outside or beyond the obvious field of physical activity, and a solution of the physical problems in connection with the maintenance and operation of railways. Quite apart from the economics of railway labor, there is another field that I am sure will, if comprehended reasonably well by the association, add a great deal to the value of this organization.

The laborer is much more than a physical machine that we use in carrying out this part of the work. When we consider the housing of these employees, we at once face the human element, and there, whether we recognize it or not, and whether we are prepared to admit that which is before us, we then have the wonderful ele-

ment of the human heart, with all of its longings and its aspirations, noble or ignoble.

In so far as we can comprehend the human element; in so far as we can handle and cultivate it; in so far as by proper treatment of the man as a human, as a man like ourselves; in so far as we may properly and legitimately satisfy his ambitions, you will readily see that we are building up an *esprit de corps*, and any organization that will do that will find that it is a wonderful help, a wonderful strength, in the organization as a whole, in working out these physical problems and getting physical results. In so far as we can get together employers and employees, as directors of work and as those who obey directions, the closer we can get together as human beings on a common ground of understanding, the nearer we are going to get the solution of the really great problems before us.

I recognize we are not going to do that in a day. I don't know whether it will ever be accomplished or not. That element of the future is quite obscure to me, and I presume it is to you, but regardless of what we think of it now, of our preparation or lack of preparation to meet and handle it, there is the great problem of the future. There is the great problem that might be covered in a general way by the word socialism.

Aside from all those large questions, we can make a little beginning here in the matter of the housing of these employees, in the treatment that we can give them, and in the human touch that we can bring to them. To the extent that we do that we will be contributing something to the solution of the really great problem of the future, not only in the problems of business, but in all the conditions in this country and Europe and all over the world. The war has developed this great problem to an acute stage, and we must, whether we wish to or not, recognize the fact that we do not stand today where we stood yesterday on this question. It is becoming more and more acute every day, and I believe that it will be profitable to this association to think seriously about these things, as I have no doubt you are thinking, because in that common thought finally, perhaps, some solution will be found.

The Chairman: I think the manifestation of this human interest is shown in the designs that have been presented for providing these men with decent places to live in, and the committee certainly has provided some very satisfactory and adequate means to serve this end.

R. H. Ford (C. R. I. & P.): I think perhaps it may be of some interest to the convention to know what has been done along the line of Mr. Campbell's remarks by the railways generally. Of course, as we all know, we have gone from the 10-hr. to the 8-hr. day. I have no doubt but what all railroad men have endeavored to take care of their employees, and we have got to accomplish more work in the 8-hr. period or in the 10-hr. period. The great trouble with our laborers is that the ratio of efficiency is very low, and the cause of it is due to the wretched housing and feeding that we as railroads have permitted our men to continue in. There isn't any gain-saying the fact that as a business proposition we have not given attention to the fact that the old style methods of housing and feeding were bad.

There has been more progress made, I think, collectively, on the railroads during the past year in housing and caring for their men than there has been in the previous 10 years, but we have only made a very slight beginning. I look at this thing purely as a business proposition. There is no doubt that the humanitarian idea and element is an important factor, as I think some of us begin to understand. I do not believe that we have appre-

ciated the benefit of caring for the common laborer.

The committee received very little information from the members generally as to this labor question. If the committee is to do the work that I believe is so important they have got to hear more from the general body of the members than they have in the past year or two. I think Mr. Campbell is absolutely right. We have got to take up the matter from an entirely different angle. We have got to make an intensive study of the common labor problem from an altogether different angle than heretofore. As you all know, the result of the last year or two has changed the condition so that some action that is positive and direct will be necessary if we are going to continue.

Report on Rules and Organization

A large amount of work has been done on "Manual of Rules for the Guidance of Employees of the Maintenance of Way Department," but the data are not in shape to be presented at this meeting, and hence the committee asks for further time in which to complete this topic. Progress is also reported on the other subjects. The committee recommends that the same subjects be reassigned for the coming year.

Committee: W. H. Finley (C. & N. W.), chairman; F. D. Anthony (D. & H.), vice-chairman; O. F. Barnes (Erie), E. H. Barnhart (B. & O.), W. C. Barrett (L. V.), H. L. Browne (C. R. I. & P.), J. B. Crothers (C. F. & F. W.), S. E. Coombs (N. Y. C.), C. Dougherty (Soo), H. M. Edgerton (C. G. W.), B. Herman (Soo), A. J. Himes (N. Y. C. & St. L.), F. D. Lakin (Erie), B. M. McDonald (N. Y. C.), Jos. Mullen, E. T. Reisler, W. H. Rupp, P. T. Simons, R. E. Warden (M. P.).

Discussion

(In the absence of the chairman, W. H. Rupp presented the report.)

Mr. Lewis: The committee recommends that this report on typical plans for housing labor be received as a proper report.

Mr. Stimson: If there is no objection, it will be so received.

(Mr. Lewis then presented Appendix C, which was accepted as a proper report.)

Mr. Lewis: We present Appendix D as a progress report, and desire its reassignment for further consideration.

The Chairman: If there is no objection, that will be the course taken.

(The committee was then excused with thanks, and the meeting adjourned.)

Mr. Rupp: The committee decided to make no recommendation in regard to rules and regulations because of the large number being put into effect by the Federal Management. With regard to fire protection, you probably know the government has taken over the insurance of the property, and the large force of inspectors put out by the government has made the rules for this particular department. This matter is in a state of transition, as the rules are changing from time to time, and we think that this subject should also be reassigned.

Subject 6: "Prepare rules for the inspection of bridges and culverts" is a very broad subject, and we recommend that you reassign these subjects for another year, and we will report progress over the whole subject. I move that this report be accepted as a progress report and the subjects reassigned to the committee.

(The motion was carried and the committee excused.)

Report of the Committee on Track



IN APPENDIX A the committee presented a number of changes in the Manual made necessary by changes in plans for turnouts and crossovers, proposed in Appendix B.

In Appendix B the committee submitted typical plans of turnouts, crossovers, slip-switches and double crossovers and detail plans for such work and recommended their adoption.

In Appendix C the committee reported on the reduction of taper of tread of wheel to 1 in 38 and on canting the rail inward and submits the matter as information, in addition to the report the committee made on the same subject in 1918.

The committee has continued its investigations of tie-plates subject to brine drippings, but on account of the unsettled conditions during the past year has been unable to obtain reliable data in connection with its tests now being made on the tracks of the Chicago Junction Railway at Chicago. The committee expects to start new tests during the current year.

The committee has prepared a specification for relayer

rail for various uses, but it is not ready to submit it to the Association.

In Appendix D the committee reports on reducing the allowable flat spots on freight car wheels, and recommends that the report be received as information and referred to the Master Car Builders' Association with the recommendation that the allowable limit of flat spots be fixed at $1\frac{1}{2}$ in.

The committee reported progress on the effect of fast trains upon cost of maintenance of way and equipment.

Conclusions

The committee recommended for adoption and publication in the Manual plans for frogs and switches, as follows:

Sixteen ft. 6 in. split-switch with uniform risers; 16 ft. 6 in. split-switch with graduated risers; 11 ft. 0 in. split-switch with uniform risers; 11 ft. 0 in. split-switch with graduated risers; details of split-switch fixtures (general); details of split-switch fixtures (special features); detail of split-switch fixtures, heel plates and turnout plates; illustration bills of material for 11 ft. and 16 ft. 6 in. split-switches, in accordance with the above plans; plans for No. 6, No. 7, No. 8 and No. 10 rigid frogs and No. 10 spring rail frog.

Committee: W. P. Wiltsee (N. & W.), chairman; M. C. Blanchard (A. T. & S. F.), Geo. H. Bremner (I. C. C.), Garrett Davis (C. R. I. & P.), P. D. Fitzpatrick (C. V.), G. W. Hegel (C. J.), T. H. Hickey (M. C.), T. T. Irving (G. T.), J. B. Jenkins (B. & O.), H. A. Lloyd (Erie), J. R. Leighty (M. P.), F. H. McGuigan, Jr. (G. T.), J. V. Neubert (N. Y.

C.), R. M. Pearce (P. & L. E.), H. T. Porter (B. & L. E.), J. H. Reinholdt (M. & St. L.), E. M. Rhodes (B. & O.), J. B. Strong (Ramapo Iron Works).

Appendix A—Revision of Manual

With the adoption of the plans shown in Appendix B, it will be necessary to eliminate the plans on pages 169, 170 and 171 in the 1915 Manual. The specifications for frogs, crossings and switches, on pages 172 to 181, will need revisions in paragraphs 10, 11, 18, 38, 43, 48, 52, 53, 61 and 62. The most important of these changes are, in the throw of the switch, the tie spacing at the heel of the joint, the angle of planing chamfer-cut, the size of switch rods, the lengths of No. 6 and No. 8 rigid frogs, and material of fillers, riser blocks and spring covers.

The revision of the tie-plate specifications was carefully considered in connection with the specifications now being prepared by the American Society for Testing Materials, but as that tentative specification has again been revised, it was thought advisable to delay this matter and recommend that the next committee consider these specifications as well as other specifications in the Manual in connection with the committee of the American Society for Testing Materials, and if possible decide on a specification that has the approval of both associations.

Appendix B—Typical Plans of Turnouts, Crossovers, Slip-Switches and Double Crossovers

The plans were made for 100-lb. rail, but the plans and specifications will apply for any standard rail section weighing 80 lbs. or over. No patented features have been specified, and all details shown are recommended as being good practice established by use in service on the railroads of America. Where alternates are detailed the parts have been made interchangeable in so far as possible by giving the essential dimensions. All alternates detailed are in extensive use by preference in some parts of this country.

The plans as submitted have the approval of both the Track committee and the switch and frog manufacturers of the Manganese Track Society. It has been found that there are in use at the present time not only a great variety of styles of switch fittings, but a variety of dimensions for the same style of fittings used on the railroads of America. The adoption of these plans will not only make the dimensions uniform for the same style of fittings, but will make the different styles of fittings largely interchangeable.

SLIP-SWITCHES

The Committee on Signals and Interlocking has suggested a change in the drilling of the first holes in the switch point to read $2\frac{1}{2}$ in. by 5 in. by 5 in. by 5 in., but after a conference we were advised that the Committee on Signals and Interlocking is not unanimous on this question and can work to the present drilling, which is better suited to hand-thrown switches, and the interlocking details can be worked with the present drilling satisfactorily; so our committee has decided not to recommend any change in the spacing of holes from the end of the rail specified in the present Manual, page 179. The height of the holes, however, is not specified in the Manual. A height of $1\frac{3}{4}$ in. above base of rail, measured on the face of reinforcing bar, is recommended so that the height may be uniform and the switch slips interchangeable.

Switch plates are detailed in two widths, 6 in. width and 7 in. width; the riser plates in two styles, solid base riser plates and pressed riser plates. In the 6-in. width the pressed riser plates are shown of $\frac{5}{8}$ in. by 6 in. stock; the solid base riser plates of $\frac{1}{2}$ in. by 6 in. stock, under base of stock rail; the 7-in. width of $\frac{3}{4}$ in. by 7 in. stock. The 7-in. width as specified in the 1915 Manual is rec-

ommended for congested traffic conditions, but the lighter 6-in. width is desirable for use where there are less congested traffic conditions. The switch plates, in any case, being longer than standard tie plates as used for tangent track, should preferably be of heavier section. This should be taken into consideration in making up bills of material, especially for tie-plated turnouts.

Switch rods as specified in the 1915 Manual are recommended of rigid style when the throwing fixtures are provided with adjustment for wear and other causes. However, as there are a large number of throwing fixtures in use that do not provide these adjustments, three details of adjustable switch rods and clips are illustrated. The drilling in the switch points being the same, any of the switch rod and clip details can be applied.

Two styles of split switches are shown, one of uniform risers and one with graduated risers. For tie-plated turnouts, where equivalent plates and fixtures are used, the weight of material is approximately the same for the two styles of switches.

The split-switch with uniform risers is a development of the 16-ft. 6-in. switch shown on page 178 in the 1915 Manual. The elevation of the switch rail is run off in the lead rails. The heel plates have been detailed not only to provide for the run-off of the switch elevation, but also for shoulders for both the lead rails and the stock rails. A variable tie spacing is given so that the same detail of plates will apply to turnouts No. 7 to 10 inclusive. This construction provides shoulder tie plates from the heel of the switch back to where there is sufficient spread to permit the use of standard shoulder tie plates. With this style of switch the splice bars may be bolted up tight, and the play between the shoulders back of the switch heel allows sufficient flexibility for the throw of the switch.

The plan of the split-switch with graduated risers details a 16-ft. 6-in. split-switch with a vertical bend in the switch rail so that the heel joint is level with the stock rail. A heel block is illustrated with the bolts tightened on pipe thimbles, permitting a hinge motion for the throw of the switch. With this style of switch, the heel joint being level, additional heel or turnout plates are not required except when further tie plating is desired, as in a tie-plated turnout. Also, with this style of switch the equipment can be cut down to a minimum by omitting the heel block and heel plates for a cheaper switch for emergency or light traffic requirements.

RIGID FROGS

One style of rigid frogs is detailed for No. 6, 7, 8 and 10 frogs, in which the flare in the wing rail is machined from the head of the rail. This is recommended in preference to the bent flare, as it allows the use of shorter bolts and more rigid construction. The detail of point planing conforms to the 1915 Manual. The diameter of the bolts is specified to vary according to the height of the rail.

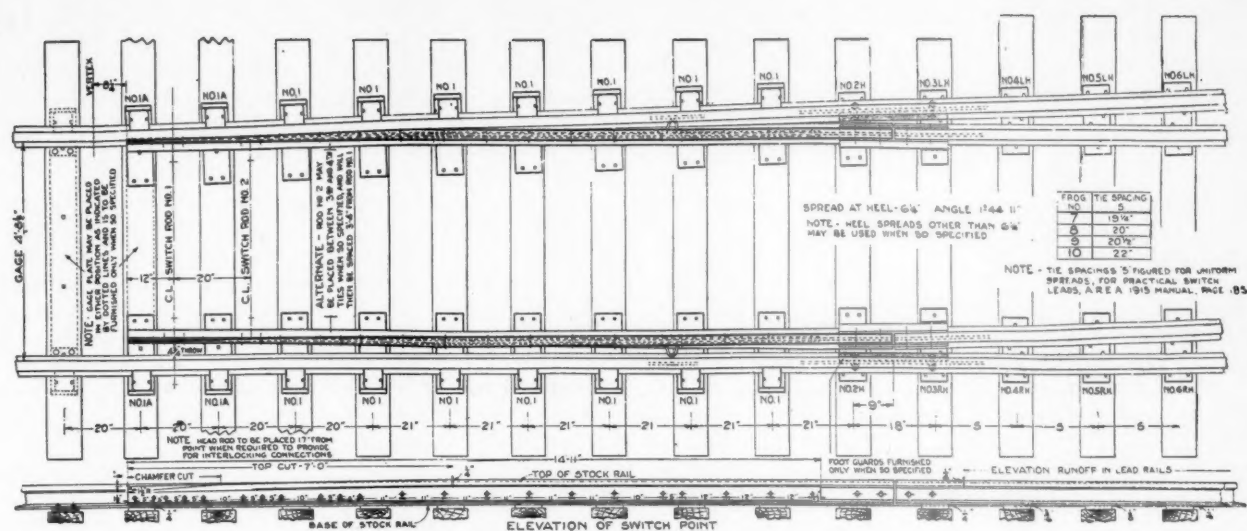
Two approved methods of plating are illustrated. The shorter three-tie base plate with tie plates beyond is recommended rather than the long base plate as illustrated in the 1915 Manual. For well-ballasted track individual tie plates throughout are recommended as good practice.

SPRING RAIL FROGS

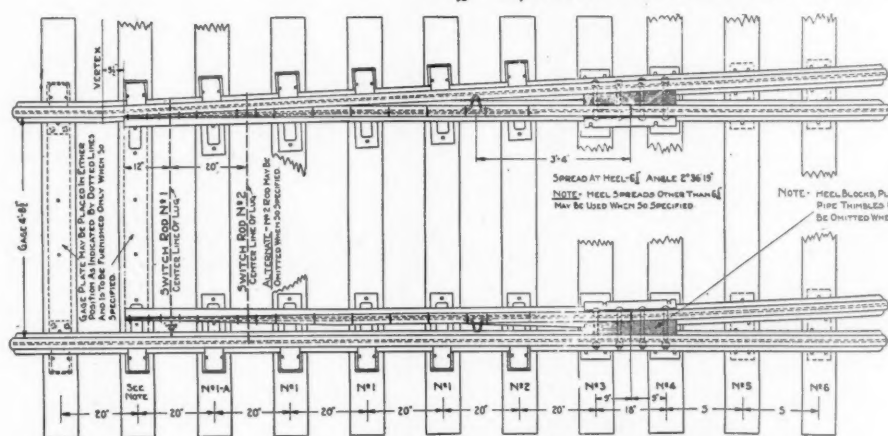
The spring rail frog is not customarily used except on the main line. A No. 10 frog is detailed to go with a 16-ft. 6-in. switch. The details, however, will apply in general to Nos. 8 and 11 frogs.

GENERAL NOTES

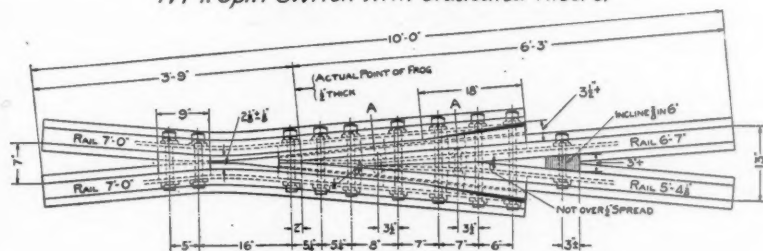
The throw of the switch is specified $4\frac{3}{4}$ in. on the center line of switch rod No. 1. This will make the throw



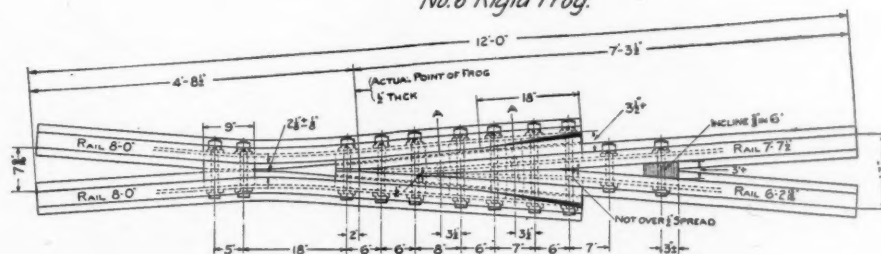
16½-Ft. Split Switch with Uniform Riser.



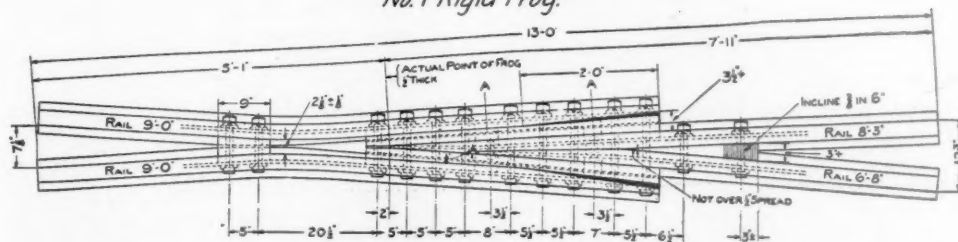
11-Ft. Split Switch with Graduated Risers.



No. 6 Rigid Frog.

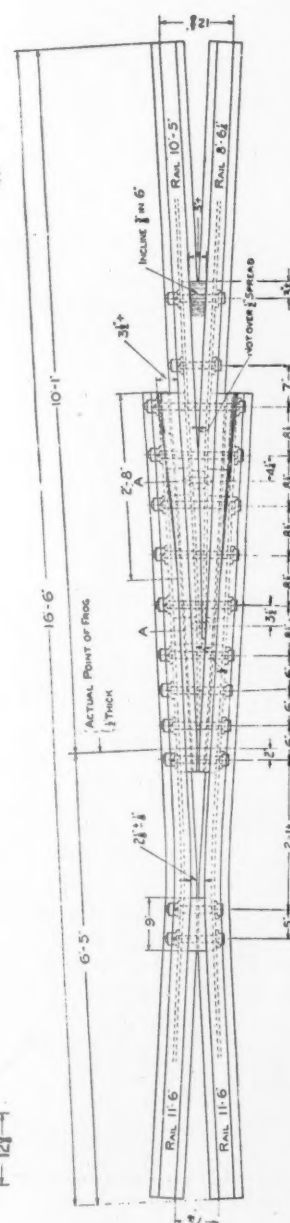


No. 7 Rigid Frog.



No. 8 Rigid Frog.

Standard Switch and Frog Designs



No 10 Rigid Frog.

at the point approximately 5 in. in practice, or, theoretically, 4 15-16 in. at the point of a 16-ft. 6-in. switch. The tie spacing at the heel joint for the switches is shown as 18 in. which is to be recommended rather than the wider spacing shown on the plans in the 1915 Manual. The angle of planing the chamfer cut is specified as 78 deg., as the 70-deg. angle specified on page 179 in the 1915 Manual is generally considered too abrupt and is not in common use.

The switch rods are specified in two sizes, 1 in. by 2½ in. and ¾ in. by 2½ in., as the ¾-in. by 2½-in. rods, as specified on page 180 in the 1915 Manual, are considered too light to meet heavy congested traffic conditions.

The No. 8 rigid frog has been detailed 13 ft. long, instead of 13 ft. 6 in. long, as specified on page 184 in the 1915 Manual, so that it may be substantially built and cut from 33-ft. rails. The 6 in. difference in length is made on the heel end of the frog, and will not interfere with theoretical alignment data for the lead.

The No. 6 rigid frog has been detailed 10 ft. long, as this length provides ample room for splice bars. A longer frog is considered objectionable for a sharp turnout.

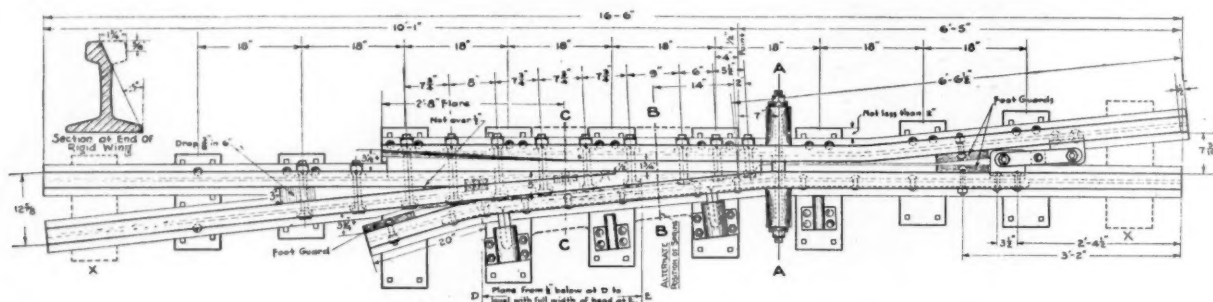
It will be noted that the frogs recommended in the Manual are Nos. 8, 11 and 16. While the committee is

rail must give the proper contact to provide the least amount of sliding friction.

In the past it has been the general practice of the railroads to place the vertical axis of the rail perpendicular to the plane of the track. However, some roads have deviated from this practice and canted the rail inward. With the standard Master Car Builders' wheel taper of 1 in 20 and the vertical axis of the rail at right angles to the plane of track, the point of contact with the rail of A. R. A. section and 14-in. top radius is $45/64$ in. inside of the center of the rail toward the gage side and for wheels having a 1 in 38 taper and the same section of rail, the point of contact is $23/64$ -in. inside the center of rail.

The proceedings of the Master Car Builders' Association for 1916, states as follows concerning wheel tapers:

"A flange thicker than the present standard has some distinct disadvantages. One of the strongest arguments offered for the adoption of the present taper of tread of 1 in 20 was the opportunity afforded a pair of wheels to move laterally until both run upon a common diameter, this condition tending to keep flanges away from the rail, thereby not only decreasing the flange and rail wear, but train resistance as well. Unless the whole track structure



No. 10 Spring Rail Frog

not reconsidering this recommendation, it is its intention to submit, as well as plans for frogs of those angles, also plans of Nos. 6, 7, 10 and 20 rigid frogs and No. 10 spring frog, as there is considerable demand for frogs of these numbers.

Appendix C—Reduction of Taper of Tread of Wheel to 1 in 38 and on Canting the Rail Inward

Prior to 1878 the amount of coning in car and engine wheel varied. At that time, a ratio of 1 in 38 was adopted by the Master Car Builders' Association and this remained standard until 1907, when the association revised the taper to 1 in 20, the present standard. Twenty-six railroads in the United States and Canada have reported to the committee on this subject and 22 of the 26 state that the standard coning of 1 in 20 is used on all their equipment. Two roads use a coning of 1 in 38 on all steel and steel-tired wheels and 1 in 20 coning on cast-iron wheels. One road uses a coning of 1 in 38 on all equipment. Another using a coning of 1 in 20 states that it is about to change to 1 in 38. One road uses no taper on engine and tender wheels and a taper of 1 in 20 on passenger and freight equipment.

Experience has shown that a certain amount of taper of tread of wheels is necessary to reduce rubbing or slipping friction between the wheels and the rails which is the cause of loss of metal from the flange and tread of the wheel and from the rail, instead of from rolling contact. For economical wearing to both wheel and rail, the wheel must roll on the rail with the least amount of rubbing and slipping and the wheel travel parallel to the rail. The coning of the wheel and the contour of the head of

is changed, a thicker flange would reduce or eliminate entirely this opportunity for lateral motion."

There are also several disadvantages of heavy coning, one being that the surface of the rail gradually wears to an inclined surface similar to cone of wheel. In this condition, the abrasion of metal and slippage resistance is considerably increased.

It would appear that the amount of taper for minimum wear of wheel is not the condition which results in economical wear and least stress in rail. In view of the fact that rail must be designed for the heaviest wheel loads, while the wheels are designed for a definite car capacity, it may be expedient to sacrifice some degree of service of wheel to favor the factor of safety and life of rail.

The committee at this time has not received sufficient information, nor is it satisfied, to recommend whether or not the rail should be canted and to what extent. However, it does feel at this writing that the canting of rail 1 in 20, which is the same as the taper of tread of the Master Car Builders' standard, is too much. Therefore, from these general conditions which are cited, it would indicate that if the rail was installed and maintained in this position so as to provide a uniform bearing and wear on the head of the rail, which of course in turn would give the best area of contact of the equipment, the best results would be obtained from wheel wear and rail wear. In recent years, the slightly extra length, or extra bearing, of the tie plate on the shoulder or outside of base of rail was the largest factor in this respect.

The report was accompanied by a tabulation of the replies received by the committee to its circular letter

asking for information concerning the wheel taper and inclination of the rail.

Appendix D—Reducing Allowable Flat Spots on Freight Car Wheels

The committee is unanimously of the opinion that a $2\frac{1}{2}$ -in. flat spot under a modern heavy freight car creates a severe damaging stress in the rail and that the present allowable limit of flat spots is excessive. Forty years ago, in 1878, when the average freight car wheel load was but 8,250 lb., the Master Car Builders' Association fixed the allowable limit of flat spots at $2\frac{1}{2}$ in., and although wheel loads have increased to 18,750 lb. (100,000-lb. capacity car) and as high as 30,000 lb., and the speed of trains is now much greater, the present Master Car Builders' rules retain the allowable limit at $2\frac{1}{2}$ in.

In 1916 the committee endeavored to confer with the Master Car Builders' Association, but was informed that their executive committee were unanimously of the opinion that—

(a) Although maximum car capacity has greatly increased, there has been a corresponding increase in the strength and durability of cars and rails, so that relatively the $2\frac{1}{2}$ -in. limit remains quite safe.

(b) The corners of a $2\frac{1}{2}$ -in. flat spot soon become rounded so that the actual impact therefrom is much less than the theoretical; also the force of the blow is greatly diminished by the elasticity of car springs and roadbed.

(c) The reduction of the limit would mean tremendous expense for changing and scrapping flat wheels, and for these reasons the Master Car Builders' Association has steadfastly refused to consider suggestions from the American Railway Engineering Association that the allowable limit be reduced.

On the other hand, American Railway Engineering Association committees, while admitting the lack of accurate corroborative evidence, has consistently contended for reduced limit, because—

(a) The impact from a flat spot under the modern heavy car is many times greater than the impact from the car of 1878, when the present $2\frac{1}{2}$ -in. limit was fixed, due to much higher speeds and the fact that the maximum wheel load is now nearly four times heavier than in 1878.

(b) Actual tests have indicated that a $2\frac{1}{2}$ -in. flat spot delivers a serious blow to the rail.

(c) It is a fact that rails are broken by flat spots, though specific cases have been difficult to cite, because often the rail, while badly damaged, may not break until some time after the passage of the flat wheel.

(d) The reduction from $2\frac{1}{2}$ in. to $1\frac{1}{2}$ in. would not be very expensive, for the reason that very few additional car miles can be obtained before a $1\frac{1}{2}$ in. flat has become $2\frac{1}{2}$ in., and, further, the greatest damage to the track occurs while the wheel is making these last few miles.

The committee, as the results of studies during the past two years, offers the following additional reasons why the allowable limit of flat spots should be reduced from $2\frac{1}{2}$ in. to $1\frac{1}{2}$ in.

(a) Ordinarily, wheels having $2\frac{1}{2}$ in. flat spots are removed from the axle and scrapped, whereas if the limit were fixed at $1\frac{1}{2}$ in., it would be possible to reclaim such wheels and replace them in service by grinding out flat spots without removing them from the axle and at a cost of about \$0.60 per pair. Grinding is being done with excellent results on a number of roads and is recognized by authorities as good practice, provided, of course, that the wheel has not been burned during the process of flattening. Therefore, a reduction of the allowable limit from $2\frac{1}{2}$ in. to $1\frac{1}{2}$ in. would not only lessen the impact and damage to the rail, but should prove economical from the standpoint of service in life of wheels.

(b) While it is true that the strength and stiffness of rails has more than doubled (if we assume 60 lb. and 100 lb. A. S. C. E. section as the standards of 1878 and 1917 respectively) and as contended by the Master Car Builders' Association has almost kept pace with increasing wheel loads, it is a fact that this added stiffness of the rail and track structure actually augments the impact from a flat wheel, and this is especially true in winter. Recent tests on the Pennsylvania Railroad show that the average load from a flat wheel recorded on frozen roadbed was from 15 to 25 per cent greater than in warm weather tests.

Increasing the rigidity of the track structure reduces the distance in which a rail may deflect and absorb the energy of a blow from a flat wheel and consequently increases the impact.

Questionnaires were sent to 55 railroads for the purpose of securing data as to damage done to rails and opinions as to whether the present allowable limit should be reduced. Replies were received from 26 roads and may be summarized as follows:

Roads. No.	Miles.	Favor Less Than $2\frac{1}{2}$ " Limit.		Remarks.
		Yes.	No.	
16	51,393			Three roads (5,395 miles) report several hundred rail failures due wholly to $2\frac{1}{2}$ -in. flats spots. The remainder favor a reduction of limit, but have no specific data as to failures.
5	26,485		No.	Have no data to indicate that present limit should be changed.
2	3,705		No.	Regard present limit as O. K.
23	81,483			

Conclusion

The committee is of the opinion that the allowable limit of flat spots should be reduced from $2\frac{1}{2}$ in. to $1\frac{1}{2}$ in. as a means of securing greater service life of both rail and wheels. We, therefore, respectfully suggest that the Association refer the above-mentioned facts to the Master Car Builders' Association, with the recommendation that the allowable limit of flat spots be fixed at $1\frac{1}{2}$ in.

Discussion

W. P. Wiltsee (Chairman): The committee has reported progress on a number of subjects and the principal one is No. 2, "Report on Typical Plan of Turnouts, Crossovers," etc.

(Mr. Wiltsee then read the matter under subjects 1 and 2 from the report, as found in appendices A and B.)

Since this report was prepared the committee has continued its work, and has prepared tentative plans for 22 and 30-ft. switches; Nos. 11 and 16 rigid frogs; Nos. 8 and 11 spring frogs; 8-ft. 3-in., 11-ft. and 16-ft. 6-in. guard rails, and also have considered plans for a No. 20 frog. They are not in shape to present at this meeting. It has been necessary to make plans that could be used under all traffic conditions. We have endeavored to keep the standards down to a minimum. This report is the report of practically the whole track committee. I move the adoption of these plans.

A. Montzheimer (E. J. & E.): I notice this report does not show the clamped frog. We have been using the clamped frog for over 12 yrs. and it has been very satisfactory. It would be a good thing if this report was so made that we could use the clamp frog and still be in line with this practice.

C. W. F. Felt (A. T. & S. F.): I second that suggestion, and it has occurred to me a good way to cover that would be to prepare an alternate plan.

Mr. Wiltsee: The committee had tentative plans drawn up on that matter. Because of the recommendations of some members of the committee we did not include clamped frogs.

A. H. Mulliken (Pettibone, Mulliken Co.): Standard

plans have been prepared for clamped frogs. We have alternates on switches and on spring rail frogs, and it would seem fair to the 60,000 miles of road that are using this clamped frog that there should be this alternate.

L. Yager (N. P.): We are using this frog.

R. S. Parsons (E. R. R.): I don't think the question at the present time is whether a clamped frog is a good one. The question is whether we shall adopt the report of this committee, and embody the essentials in the shape of this standard plan. This committee has spent a good deal of time on these plans, and they have taken into consideration other ideas. This is a peculiarly excellent time to have standards adopted throughout the United States. The whole tendency of the Railroad Administration has been to adopt standards. If we had these plans adopted and included in our Manual, the track man would find something tangible on this particular question, which is sometimes so troublesome. The clamped frog can be developed and introduced at the next meeting, if that is considered desirable.

C. W. Baldrige (A. T. & S. F.): In the matter of adopting the bolted frog as recommended practice, and not showing any alternate plan, or permissible plan, such as the clamped frog, I remember a year or two ago there was great criticism of various railways for not conforming to the recommended practice which is published in the Manual. It has been shown that a large mileage of the railways are using successfully and satisfactorily a clamped frog, and unless there is some real good reason for recommending against it, the committee should be instructed to select an alternate plan. I do not believe there is any argument which justifies a ruling against that type of frog.

J. E. Willoughby (A. C. L.): What governed the committee in determining the length recommended for the frog and switch point?

Mr. Wiltsee: The length of the frog is governed by the cutting of the rail. The different lengths of frogs work out better for a 33-ft. rail and there is no waste in material. The length of switch points was adopted by the association a number of years ago.

Mr. Willoughby: Is it the idea of the committee that the cutting of the rail is more important than any other feature of the design?

Mr. Wiltsee: No, sir. We met all other features of the design, such as length, width, yield, and every other point we could think of, and still saved the cutting of the rail.

John V. Hanna (K. C. T.): I looked into this question a few years ago. The manufacturer was asked what the advantage would be to the company in using 16.5-ft. points instead of 15-ft. and he said there was none. I would like to have information as to how the purchaser gets the benefit of economy in cutting up the rail.

Mr. Mulliken: In cutting rails and making frogs and switches the material is handled by machinery more rapidly than you gentlemen imagine. It is a great economy and convenience to cut a 33-ft. rail through the center. I do not think it is fair, in making 15-ft. switches, to charge the roads for 16.5-ft. of rail, because if it is necessary to make a 15-ft. switch, we could get 30-ft. rails from the mills.

Mr. Wiltsee: The association adopted a 11-ft. and a 15-ft. switch a number of years ago. It seems to me the advantage is purely with the railroad company. If you get a 16.5-ft. switch you get a better one with a better angle.

Mr. Hanna: How much advantage is there in the angle? It may be that the manufacturers now figure a little differently on the waste, but they told us we did not really make anything by taking the longer point.

The President: Naturally, the length of a frog, a guard rail or a switch point depends on the merchantable rail that it is made of. In the days of the 30-ft. rail we used a 7.5-ft. guard rail. When we used a 33-ft. rail it was divided into four pieces. In our frogs we used a 10-ft. switch point, $\frac{1}{3}$ of a 30-ft. rail. My idea is you want good merchantable stuff, as there is no advantage in getting odds and ends.

The different reports from the mills show that they roll from 350 to 750 tons a week for frog and switch manufacturers.

Mr. Mulliken: Twelve concerns are making frogs and switches in the United States, and when they are running full time they will use over 400,000 tons of rail in 12 months for this purpose.

J. L. Campbell (E. P. & S. W.): I have no objection whatever to these plans or anything that they contain. I think the committee has submitted a very excellent set of plans as far as they go. My objection is on account of some of the things they do not contain. I believe before we get through with the plans and consider the matter settled for the time being, that they should include a plan for the clamp frog, and I believe, also, some additional adjustments of the connecting rod.

If the committee would consent to an addition to that motion, and have it include a direction to them that for the next year's work they recommend a plan for a rigid frog and make an additional study of the adjustment of the connecting rod, all of my objections to the matter as it now stands will be removed, and I would like to see the matter disposed of in that way. I would like to see these plans adopted at this time, as far as they go, with the understanding that the subject is not closed and we will have an additional report along these lines including the points I have mentioned, next year.

Mr. Wiltsee: The subject is not closed by any means. If it is the desire of the convention that we include a clamped frog, the committee is only too willing to do it.

Mr. Campbell: I move that the motion before the house, which is on the adoption of these plans, be amended to include a direction to this committee to bring in at the next annual convention a recommended plan for a clamped frog, and an additional report upon adjustments of the connecting rods.

(This motion was carried.)

Mr. Wiltsee: I move that the convention adopt the plans.

(Motion carried.)

Mr. Wiltsee: I move that Appendix C be received as information.

(Motion carried.)

Mr. Wiltsee: I move that the subject matter in Appendix D be accepted as information and referred to the Master Carbuilders' Association.

C. E. Lindsay (U. S. R. A.): I want to emphasize the fact that the weight on the wheel cuts a very great figure. A 1-in. flat spot on a locomotive or on a locomotive tender does more damage than we have any appreciation of, and I think that fact should be emphasized in presenting the matter to the Master Carbuilders' Association, or the mechanical section of the American Railroad Association. Their attention should be called to the fact so that they might differentiate if they consider it necessary in determining the limit of the flat spot under different loadings.

Mr. Wiltsee: The committee will modify the report to agree with the instructions of the Master Carbuilders' Association, and if they make a report limiting the flat spot to $\frac{1}{2}$ -in. I think that will cover it.

(Mr. Wiltsee's motion was then put and carried.)

(The committee was excused with thanks.)

Report on Conservation of Natural Resources

AT THE MOMENT when our country was engaged in the supreme effort of its lifetime to "make the world safe for democracy," when it was speeding up its war industries to the limit and straining every nerve to deliver a maximum of men and equipment to the battle line, there came a shortage of coal. While the signing of the armistice will relieve to a certain extent the demands abroad, the requirements at home will be as persistent as ever, for there must come a period of reconstruction. During this period the leading industries will simply change their product from a war to a rehabilitation basis and continue as active as they were before the armistice was signed. Those industries not necessary to the winning of the war that were obliged to curtail their production to economize on fuel will now seek to recuperate their interests by a speed-up program of production. On account of the shortage of coal brought on by the exigencies of war and which, no doubt, will continue on account of the reconstruction needs, the committee felt that it should confine all of its attention this year to a study of the conservation of fuel.

Of the total amount of coal used in the United States in 1917, 544,000,000 tons were bituminous and 77,000,000 were anthracite. As the railroads consumed 175,000,000 tons of this, or nearly one-third of the total output, their fuel question becomes one of huge proportions and demands the most serious thought and attention that they are able to give it.

There are three ways of relieving the situation: (1) By getting a better grade of coal from the mines. (2) By increasing our facilities for transportation. (3) By practicing conservation.

If the mines will see that better and cleaner coal is delivered to the railroads it will save them transporting thousands of tons of slate, rock, and other impurities commonly found in bituminous coal. These surplus materials are an additional burden, not only to the railroads that haul them, but also to the consumers that use them, for they decrease the efficiency of the power-plant and increase the size of the ashpile.

The Railroad Administration is ordering new equipment and is repairing that which it already has; but even then it cannot cope with the situation, for the roads must handle a heavier tonnage than they have ever handled before. They must haul raw material to the industries, they must carry foodstuffs and provisions for the Army and Navy, and they must move soldiers from the camps and the water-front.

The greatest possibility seems to lie in conservation. Statistics show that during 1917 the total equipment for handling coal constituted about one-third of all the traffic of the country. The transportation of fuel becomes then a problem of extraordinary magnitude and offers enormous opportunities for saving by the railroads and other industries of the country. As the railroads use nearly one-third of the total amount of coal consumed, a heavy responsibility rests with them in meeting the nation's need.

One-fifth of all coal burned in locomotives is used when the engines are not moving trains. Some of this is consumed at engine terminals and some on passing tracks waiting for trains to meet. Most of this coal is necessary, but it does present to the despatcher, yardmaster and roundhouse foreman a splendid field for study in the economy of the use of fuel. They should see that trains move promptly, spending no more time in yards and on sidings than is necessary for safety in operation.

The trainmen should see that equipment and material entrusted to their care is handled to the best advantage

and they should put forth every effort to expedite train movements. Four-fifths of all the coal burned in locomotives is consumed while they are actually moving trains. For the use of this fuel the engine crew is largely responsible. If they could save only one per cent they would use 1,600,000 tons less a year. Their efforts would be greatly enhanced, however, if the equipment were in good condition.

The stationary boilers in shops, pumping stations and heating plants require a large amount of fuel, and present a great opportunity for saving in their construction and operation. This allows the maintenance of way and shopmen to serve in this great conservation program. Telegraph operators and towermen should be alert to clear their trains as soon as it is possible to do so, for every stop a train is obliged to make requires an additional amount of fuel. Conductors and brakemen should see that passenger trains do not become overheated and that cabooses do not burn more coal than is necessary for the comfort of the crew. Station agents can add their mite by saving a little each month. The efforts of each might seem insignificant, but the sum total would represent an amount that would well merit consideration.

For one reason or another, railroads are often obliged to store out-of-doors a great deal of the coal they use. Sometimes it is done to equalize traffic by using coal cars at a season when they are not in demand by the public, sometimes it is done to forestall shortage due to strikes or other interruptions at the mines; but unless proper care is exercised in the storing of such coal serious loss may result from physical and chemical deterioration.

As the Fuel Conservation Section of the Division of Operation of the U. S. Railroad Administration has given the subject a great deal of special study and attention and has prepared in condensed form a most thorough outline of the methods for conserving coal, the committee feels that it can do no better than to embody some of its recommendations in this report.

The report concludes with abstracts of these suggestions and discussions of the fuel situation in Canada and the possibilities of peat as fuel.

Committee: R. C. Young (L. S. & I.), chairman; S. N. Williams, vice-chairman; R. H. Aishton (U. S. R. R. A.), W. K. Barnard, C. B. Brown (Can. Govt. Rys.), Moses Burpee (Ba. & Ar.), C. H. Fisk, E. E. King (Ia. State Col.), William McNab (G. T.), W. F. Ogle (C. R. I. & P.), J. L. Pickles (D. W. & P.), J. W. Votey (Univ. of Va.), W. C. Willard.

Discussion

R. C. Young (Chairman): This committee this year was obliged to change its report several times, because of the changes in existing conditions, but it has prepared a short report on conservation of fuel, thinking that was one of the most important things before us at this time. Prof. King is responsible for this report, and I will ask him to say a few words to the convention about it.

Prof. E. E. King (Univ. of Ill.): The matter that the committee presents is based and taken largely from recommendations of practice of the Fuel Conservation section of the Division of Operation, United States Railroad Administration. The committee felt that it could do no better on this occasion than to recommend, or simply incorporate in its report, the recommendations of this committee.

Wm. McNab (G. T.): The convention should understand that this report is merely one prepared and furnished gratuitously to the convention as information.

Mr. Young: I move that the report be accepted.

(The motion was carried, and the committee was excused with thanks.)

Report of Committee on Signs, Fences and Crossings

A VERY MARKED IMPROVEMENT has been noted during the past two or three years in the matter of better protection of grade crossings. The great evolution in highway traffic which has taken place during the past 15 or 20 years, in which the horse-drawn vehicle has been largely supplanted by the much faster motor vehicle, has greatly complicated the grade crossing problem. The greater speed of the highway traffic to-day calls for a more comprehensive form of signal than was necessary under former conditions; for, as in train movements, there is need of definite early warnings. The motorist needs to be advised of the necessity of a stop in time to afford him ample opportunity to reduce his speed before reaching the point of danger. The old signs, calling upon the public to "stop, look and listen" before crossing tracks, are no longer adequate. In providing the necessary warning, the railroads have been confronted with a definite obstacle, since they must be installed at considerable distance from the track, and therefore usually outside the railroad property. They have therefore been without right to erect the signs or authority to maintain and protect them from injury.

The rational solution of this vexatious problem, therefore, seemed to be to place the responsibility for the cautionary signals on the state, county or municipal authorities, and this has been done in eight states. There should be no controversy as to the justice of this decision, as the matter of safety on public highways should be as carefully guarded by their properly constituted authorities as that provided by the railroads. The pioneer state in this movement was New Hampshire, which was later followed by Vermont, Massachusetts, Connecticut, Maine, California, Oklahoma and Illinois. Bills providing for similar laws have been presented to the legislatures of a number of other states, upon which action is still pending.

Most of the laws that have so far been passed contemplate locating these signs about 300 ft. from the tracks, when, in the judgment of the commission, the crossing involves such hazard as to require the installation of a "stop" sign at the crossing; and, with the exception of those of Connecticut, imposes the erection and maintenance of warning signs outside of the railroad right-of-way on the highway commissioners who have authority over the ground upon which the signs are installed, while the installation and maintenance of "stop" signs in close proximity to the tracks and therefore usually inside the right-of-way is imposed on the railroad.

In Connecticut the cautionary signs must be furnished by the railroads, but installed by the state, county or city authorities. In California the law requires vehicles approaching grade crossings of railroads to run at a speed not exceeding 15 miles per hour. Tennessee has a law requiring automobilists to come to a stop before crossing railroad tracks. Texas laws require them to reduce speed to 6 miles per hour at all crossings except those protected by gates or flagmen. The state of Washington has a law requiring automobiles carrying passengers to stop before crossing railroad tracks.

The order of the Public Utilities Commission of Illinois, issued on July 31, 1918, in the execution of statutes passed by the state legislature in June, 1917, prohibits the installation of any other signs or signals, such as advertising notices, within 300 ft. of any railroad grade crossing, to prevent any possibility of confusion with the regular crossing protection signs. This is an excellent provision, but does not go far enough. Rigid restrictions should be placed on the erection of unnecessary signs anywhere on the public highways. The motorist's attention is too often jaded by signs containing misleading

inscriptions, and until such notices and signs of fantastic design are prohibited, there will, of necessity, be more or less confusion with actual warning signs.

The commission's order included explicit specifications and drawings for both the "stop" and "approach" signs. They must be made of No. 16 gage porcelain-enameled metal, crimped backward at least $\frac{1}{2}$ in. around the perimeter. The letters must be black on a white field and the rear of the sign is painted black. The supporting post may be either wood or iron, but must be of sufficient strength to make a solid and substantial support. The posts must be designed to permit a bracket or attachment to be installed for the purpose of supporting a light or signal at night, wherever, in the opinion of the commission, this may be necessary.

The painting of black and white diagonal stripes on crossing gates and the use of circular disks instead of flags by crossing watchmen have now become common on many railroads.

Over 110,000 grade crossings were reported by the National Association of Railroad and Utility Commissioners in the 22 states from which replies to a circular letter were received. Basing calculations on the above data, it is estimated there are about 200,000 grade crossings in the United States and that there are about 2,000 persons killed annually at these crossings. It further appears from the reports that in the above 22 states only about 10 per cent of the crossings are protected by gates, flagmen or bells.

In the matter of grade crossing elimination, considerable progress has been made in Connecticut, Illinois, Massachusetts, New Jersey, New York, Oklahoma, Oregon, South Carolina and Wisconsin. Massachusetts, with only about 2,000 miles of railroad, has spent in the past 30 years about \$42,000,000; Illinois, in a much shorter period, has done work involving an expenditure of over \$55,000,000, much of it in the city of Chicago; New York, with about 8,000 miles of railroad, has spent about \$44,000,000. Estimates of the cost of elimination of grade crossings have been prepared in a few states running into hundreds of millions of dollars. In California the average cost is estimated at \$30,000 each; in Colorado at \$40,000; in New York at \$48,000, and in Wisconsin at \$25,000.

Considerable information has already been presented to this association bearing on the division of cost as between the railroads and the public. It occurs to the committee that the most equitable plan for the division of cost is that of New York, where the burden is imposed equally on the railroads and the public.

Types of Manufactured Posts

Early in September a circular letter was addressed to the officers of about 30 railroads soliciting information on concrete and steel posts. Only 19 replies were received—14 of which were to the effect that no concrete posts were used during the year and 10 to the effect that no steel posts had been used. From the remaining replies only two companies used concrete posts to any extent and that only one company used steel posts in quantity. This was, no doubt, due to the high price of steel in the case of steel posts, and to the high price of labor and material entering into the manufacture of concrete posts. This condition is likely to continue until normal prices are restored.

So far as the committee is able to judge from the replies received, those companies which have adopted concrete posts as standard, and have been large users of them, are continuing their use. Comparatively few steel

posts have been used during the year. Those roads on which wood posts are standard are not inclined to change to other types at present prices. In general, those roads using concrete and steel posts report satisfactory service.

One chief engineer, on whose road steel posts are standard, recommends that all steel posts should be set as other posts, and not be driven, in order to avoid damage to the tops of the posts. While the committee is aware that the tops of some steel posts are more or less crimped or battered in driving, it is believed to be due to some extent to careless driving, and to the use of a cap not properly designed. Especially large driving caps are now being furnished, which are claimed to be giving satisfaction. The committee therefore feels that the proposition to set all steel posts, except in the case of rock or other obstructions, would defeat the whole plan of economy in the use of certain types of steel posts, besides the difficulty of setting them with any degree of rigidity.

Committee: W. F. Strouse (B. & O.), chairman; Arthur Crumpton (G. T.), vice-chairman; F. D. Batchelder (B. & O.), H. E. Billman (M. P.), C. G. Bryan (I. C.), G. F. Black (Me. C.), A. S. Butterworth (G. F. & A.), B. J. Dalton (M. K. & T.), F. T. Darrow (C. B. & Q.), G. N. Edmonson (N. Y. C.), R. C. Gowdy (F. W. & D. C.), Paul Hamilton (C. C. C. & St. L.), Maro Johnson (I. C.), L. C. Lawton (A. T. & S. F.), S. L. McClanahan, L. A. Mitchell (Un. Tr. Co.), T. E. Rust, A. Swartz (T. & W.), W. D. Warren (N. Y. N. H. & H.), K. G. Williams (M. V.).

Discussion

Arthur Crumpton (Vice-chairman): Owing to war conditions, the committee has not reached any conclusions this year, but submits progress reports on two subjects, grade crossings and fence posts. No conclusions having been reached, the committee recommends that these reports be received as information.

(The committee was excused.)

The Evening Session

A continuation of the report of the Committee on Economies of Railway Labor took place last evening when a series of slides illustrating the use of labor saving devices was presented by R. H. Ford, principal assistant engineer, Chicago, Rock Island & Pacific, Chicago. This was followed by a talk on transverse fissures by H. M. Wickhorst, expert of the Rail committee. In the discussion which followed, J. E. Howard, engineer-physicist of the Interstate Commerce Commission, gave illustrations to indicate that such failures are the result of fatigue of the metal. A number of other speakers questioned this theory and cited a number of examples which demonstrated that the quality of the material was at least partially responsible.

Railroad Administration Approves Convention

The United States Railroad Administration has indicated its approval of the American Railway Engineering Association and encouraged the attendance of railway men. Circulars have been issued by the regional directors to this effect, the following from the Northwestern region being typical of those issued by the other directors:

"The twentieth annual convention of the American Railway Engineering Association will be held at the Congress Hotel, Chicago, March 18, 19 and 20, 1919. On account of the educational benefit accruing to employees attending these conventions, will you please arrange to have the members of this Association, as well as other officers and employees interested in the maintenance of way department, who can be spared from their duties, attend this convention, take part in the discussions, and see the exhibit of railway appliances."

Co-operation of this character has contributed largely to the attendance at the meeting of the A. R. E. A. as it did for the meeting of the Signal Association Monday.

American Railway Signal

Supervisory Association

The American Railroad Signal Supervisory Association will hold its first annual meeting in the Elizabethan Room of the Congress Hotel at 9 o'clock this morning. The first hour will be devoted to an open meeting, following which the remainder of the day will be spent behind closed doors. Some of the subjects to be discussed will be the proposed rates of salary and definition of title. Election of officers for the next year will also take place. Fifty roads are at present represented.

Division Foremen to Hold Meeting

The division signal foremen of the Chicago & North Western will hold a meeting on Wednesday, March 19. This meeting is a get-together for the foremen on the various parts of the system to permit them to become better acquainted and talk over their work.

Personnel of New Signal Division Committee

Subsequent to the amalgamation of the R. S. A. with the A. R. A., a committee on valuation, to be part of the signal division, was appointed with T. M. Carley as chairman and P. M. Gault, assistant engineer in the Signal department of the Illinois Central, Chicago, as vice-chairman. The other members are as follows: F. H. Bagley, assistant signal engineer, Louisville & Nashville, Louisville, Ky.; G. E. Beck, assistant signal engineer in the valuation department, New York Central (West), Cleveland, O.; P. F. Canfield, signal pilot, New York, New Haven & Hartford, New Haven, Conn.; J. C. Finch, signal inspector, Missouri Pacific, St. Louis, Mo.; E. E. French; Caldwell Homewood, assistant supervisor of signals, Pennsylvania, Philadelphia, Pa.; W. F. Hudson, assistant engineer in the valuation department, New York Central (East), New York; George W. Kydd, signal pilot engineer, Baltimore & Ohio, Baltimore, Md.; F. F. Schaller, signal engineer, Bureau of Valuation, Interstate Commerce Commission, Washington, D. C.; T. E. Smith, supervisor bridges and buildings, Southern Lines West, Tuscaumbia, Ala.; G. K. Thomas, assistant signal engineer, Atchison, Topeka & Santa Fe, Topeka, Kan.; C. H. Wiegand, supervisor of signal construction, Atlantic Coast Line, Jacksonville, Fla., and E. E. Worthing, signal engineer, Southern Pacific (Atlantic System), Houston, Tex.

This committee has been instructed to: (1), report on the average life in years of the important units of the different types of signal installations, considering depreciation and obsolescence separately; (2), report on the government Bureau of Valuation method of applying depreciation; (3), prepare tables for the different types of signal installations which will show the percentage of material to be added to cover waste, contour, sag, loss, breakage, etc.; (4), prepare a typical construction program which will include the various types of interlocking, automatic signals, etc., for a single track railway following with additional tracks to increase the road to a double track, three-track and four-track railroad, and (5), extension of the joint Signal Committee of the President's conference committee study of labor costs to establish percentage to be added to material to arrive at total cost.

Twenty Years of Progress in Railway Engineering

Some Facts About the Origin and Growth of This Body of Railway Men During the Last Two Decades

A LITTLE MORE THAN 20 years ago, October 21, 1898, to be exact, a little group of men met in the Auditorium Hotel, Chicago, and set on foot the preliminary arrangements for the organization of what is now known as the American Railway Engineering Association. Because of the important position which the association has since achieved and its present widespread influence in railway engineering affairs, it seems fitting to call attention to some of the earlier items of its history and to recall the names of its founders for the benefit of those who have become members of the association during the succeeding years. This, the twentieth annual convention, seems a peculiarly opportune time for gathering up some of these links that connect its present history with its past.

It is probable that few even of the most far-sighted of the founders of this association appreciated the magnitude of the movement which they were setting on foot.

As a matter of fact, some hesitancy was expressed, not as to the need of such an organization, but as to whether engineers in sufficient number would join its ranks to enable the association to assume that place in railway work which the importance of its interests demanded. Owing, however, to the indefatigable energy and competence of those who were elected to guide its destinies in the early years, the association almost immediately assumed an important position and at once assured its founders that they had made no mistake in shaping the preliminary organization and outlining plans for future work. From the very beginning the work of the association was directed along the same broad lines which have since characterized its course.

Even though their names form a part of the permanent records of the association, it is well to call especial attention to those pioneers to whom the association as at present constituted, owes so much. Those who attended the preliminary meeting on October 21, 1898, were the following:

H. A. Kennedy, general superintendent, Cleveland, Canton & Southern.
F. E. Paradis, chief engineer, Chicago Terminal Transfer.
C. Dougherty, roadmaster, Illinois Central.
G. W. Merrill, roadmaster, Chicago, Milwaukee & St. Paul.
W. S. Kinnear, principal assistant engineer, Michigan Central.
G. W. Taylor, St. Louis Terminal Association.
W. E. Emery, roadmaster, Chicago & North Western.
E. C. Macy, division engineer, Iowa Central.
W. M. Duane, roadmaster, Cleveland, Cincinnati, Chicago & St. Louis.
J. B. Dickson, roadmaster, Chicago & North Western.
L. C. Fritch, superintendent, Baltimore & Ohio Southwestern.
C. A. Wilson, chief engineer, Cincinnati, Hamilton & Dayton.
G. S. Cheyney, general roadmaster, Indianapolis, Decatur & Western.
H. W. Church, roadmaster, Lake Shore & Michigan Southwestern.
G. H. Bremner, assistant engineer, Chicago, Burlington & Quincy.
A. Torrey, chief engineer, Michigan Central.
Harry P. Robinson, editor *The Railway Age*.

The circular calling for this preliminary meeting was issued from the office of the *Railway Age*. It is a matter of some interest that it was the original expectation to graft this engineering association upon the existing Roadmasters' Association, which had formerly and has since

exerted considerable influence in matters pertaining to railway track maintenance. However, at its annual meeting at Denver, in September, 1898, the Roadmasters' Association by a close vote decided that it would remain a roadmasters' organization and not by a change of name constitute itself a possible nucleus for the proposed Engineering Association.

At the preliminary meeting a temporary organization was effected with the late Augustus Torrey, chief engineer of the Michigan Central, as chairman, and L. C. Fritch, then superintendent of the Baltimore & Ohio Southwestern, as secretary. The chairman appointed, as a committee to prepare a constitution and by-laws, John F. Wallace, then assistant second vice-president, Illinois Central, chairman; P. Alex. Peterson, then chief engineer, Canadian Pacific; Thomas Rodd, chief engineer, Pennsylvania Lines West of Pittsburgh; C. H. Hudson, chief engineer, Southern Railway, and W. G. Curtis, engineer maintenance of way, Southern Pacific.

At a meeting held in Buffalo on March 30, 1899, a permanent organization of what was then known as the American Railway Engineering and Maintenance of Way Association was effected with these officers:

President, John F. Wallace, assistant second vice-president, Illinois Central;
First vice-president, P. Alex. Peterson, chief engineer, Canadian Pacific;
Second vice-president, W. G. Curtis, engineer maintenance of way, Southern Pacific;
Treasurer, W. S. Dawley, chief engineer, Chicago & Eastern Illinois;
Secretary, L. C. Fritch, superintendent, Baltimore & Ohio Southwestern.
Directors—Augustus Torrey, chief engineer, Michigan Central; Thomas Rodd, chief engineer, Pennsylvania Lines West of Pittsburgh; D. J. Whittemore, chief engineer, Chicago, Milwaukee & St. Paul; F. H. McGuigan, superintendent, Grand Trunk; W. K. McFarlin, chief engineer, Chicago, Rock Island & Pacific; Hunter McDonald, chief engineer, Nashville, Chattanooga & St. Louis.

The first real convention of the association was held in Chicago on March 14 and 15, 1900. The success of this meeting is probably unparalleled in the history of new organizations and no small measure of the success with which the association started off is due to the great ability of John F. Wallace as presiding officer.

The association has in succeeding years honored itself as well as the chosen members in the selection of its presiding officers. Its earlier leaders were: Wallace, Kirtledge, Kelley, Johnston, Berg, McNab, Fritch, Cushing. Several of these have held office for two terms; Johnston declined re-election and Berg was removed by death less than two months after his election. McNab was elected to succeed him. In the more recent years the office has been ably filled by E. F. Wendt, W. B. Storey, Robert Trimble, A. S. Baldwin, J. G. Sullivan and now by C. A. Morse. The last named has had even more than ordinary opportunity to demonstrate his capacity, having been selected by the United States Railroad Administration as assistant director of operation in charge of engineering and maintenance.

At the convention in March of 1911 the name of the association was changed from the American Railway Engineering and Maintenance of Way Association to the American Railway Engineering Association, the old name having proved too awkward and unwieldy. The old name, however, has died hard and even to this day one



The Past-Presidents of the American Railway Engineering Association

Hunter McDonald	John F. Wallace	H. G. Kelley	G. W. Kittredge
L. C. Fritch	Walter Berg	W. C. Cushing	A. W. Johnston
Robt. Trimble	E. F. Wendt	A. S. Baldwin	Wm. McNab
			C. S. Churchill
			W. B. Storey
			J. G. Sullivan

still hears reference to the "Maintenance of Way Association."

The manual of the association, which, when it was first proposed was described as a means of "bottling up" the concentrated wisdom that had been squeezed out of a vast amount of individual investigation and the interchange of personal experiences—was first proposed by A. W. Sullivan, then general superintendent of the Illinois Central and later general manager of the Missouri Pacific. This first tentative consideration was crystallized at the fourth annual convention into a resolution presented by Mr. Berg, which, promptly adopted, became the foundation upon which the manual has grown to its present proportions and importance. The first edition was published in 1905. That this work has received widespread recognition as an authority is indicated by the purchase of over 2,800 copies of the last edition by the United States Government during the war. The association's specifications for steel bridges, the study of the effects of moving loads upon bridges, the work of its rail committee and the investigation now in progress on stresses in track are matters covered in the Manual or other publications of the association worthy of special mention. For much of this work the association has been indebted to representatives from the faculties of engineering schools who have from the first closely associated themselves in its work to the benefit of the association and with an influence upon their own work whose value can scarcely be overestimated.

The Last Days of Hiram J. Slifer

News of the death of Col. Hiram J. Slifer at one of the base hospitals in France on February 4, 1919, was a shock to his many friends and acquaintances. Dying in the active service of his country at the mature age of 62, after an active railway career in this country, Mexico and the Canal Zone, his life was not one that ever placed him under Roosevelt's classification of the "men who lead soft lives." His name will go into the records of the association as one who did it honor. Because of his wide acquaintance among fellow members of the association, we welcome this opportunity to present a few facts concerning his last days, in the form of three letters received from France, one of which he wrote himself to his friend, G. E. Greer, which is abstracted below. This gives in Col. Slifer's own words a detailed account of the accident which eventually caused his death.

"Neufchateau (Vosges), France,
"December 30, 1918.

"On November 13, two days after the Armistice was signed, I went into the German territory to make an inspection of some track where the Germans had mined and blown up an eight-foot embankment every couple hundred feet for possibly a quarter of a mile. I went on the inspection trip on one of our usual six-men gasoline inspection cars. These are just as high as the

standard car, but they are only two feet wide and subject to derailment. I had practically been living on one of these cars during October and November, and never had an accident, although many of our men were injured, but my turn came on November 13. The car was derailed near the town of Buzancy, at the point where the Germans had mined the embankment and track, and I was thrown down the bank, about eight feet high, and into a stream of running water, with the car on top of me. I have always made a habit of running inspection cars in duplicate, that is, running two cars, one following the other, so that in case one car gives out I will have the other to use, and I was very lucky to do so on this particular day, for the reason that the men on the second car discovered my absence and got me out of the water just in time and before I was drowned.

"I worked my way back to a field hospital and was later sent to an evacuation hospital, and I have been in Base Hospital No. 66 at Neufchateau since November 18. Was getting along very nicely when I was attacked with bronchial pneumonia, which affected every part of my system and my heart was very low. In fact, the doctors had some doubt as to whether I would pull through, but thanks to my constitution I am again on the mend, and am leaving here on January 2 for Cannes, on the French Riviera, where I will be at a convalescent camp until I get enough strength to rejoin the regiment, of which I am now in command, as our colonel has been relieved and is chief engineer of the First Army. I shall expect to join the regiment at its headquarters at Conflans and go back home with it, but I do not look for orders much before April or May.

"(Signed) HIRAM J. SLIFER,
"Lieut.-Colonel, C. of E., U. S. A."

The following letter by Capt. John R. Thompson, addressed to J. Beaumont, of the division of valuation, Interstate Commerce Commission, Chicago, contains an impressive account of Col. Slifer's death and funeral:

"Commercy (Meuse), France,
"A. P. O. 747,
"February 5, 1919.

"Last Saturday I was in Conflans, headquarters of the 21st Engineers, and heard that Col. Slifer was in town. I went to his quarters and had a long visit with him. You probably know that he has been in the hospital since he was injured last fall, and he told me Saturday that it was a great burden to him to be in Conflans, but he wanted to see his old friends with the 21st Engineers, and he thought he could stand it, but the strain was telling upon him badly, and when I left him he said that he knew that he had made a mistake in making the effort. He stayed in Conflans over Sunday and on Monday started for the southern part of France, but got only as far as Neufchateau and was compelled to return to the hospital at that point. This morning Col. Howard, of the 13th Engineers, came into the office and told us that Col. Slifer died yesterday and the funeral would be at the hospital near Vertuzey at 12 o'clock today.

"I attended the funeral, and to me it was the most impressive ceremony I have ever attended. It was military, and, considering the circumstances, there was a large attendance. In addition to the prescribed military escort consisting of a firing squad of about 100, a full band, honorary pall bearers of lieut.-colonels and colonels and active pall bearers of captains, there was a large gathering of officers, both from his own regiment and friends. As the body was lowered into the grave in a casket in a large American flag, the firing squad fired three rounds and then the bugler blew taps. Occasional explosions of damaged ammunition in the distance, together with the surroundings, made the ceremony most impressive, and



Col. H. J. Slifer

I will always remember it. Among the officers present that you will know were Capt. Rowland, Capt. Stonp and Capt. J. V. Brown.

"From all I have heard of Col. Slifer's experience in France, he has made an excellent officer both from a military and railroad point of view. He is well liked by all his men, and his death was a great blow to them, as I have heard those who live in Chicago often speak of the time when they could parade through the Loop on their return to the States with their colonel.

"(Signed) JOHN R. THOMPSON."

Some details of the service which Col. Slifer rendered to his country from the time that he was commissioned as major in the Engineer Officers Reserve Corps until he was incapacitated by the accident that caused his death, and a tribute to his ability as an officer of the National Army, are contained in the following letter by M. E. Pumphrey, captain of engineers, United States Army, addressed to the *Railway Age*:

"Headquarters 21st Engineers, A. E. F.,

"February 11, 1919.

"The many friends of the late Lieut.-Colonel Hiram J. Slifer will no doubt be interested in his part of the Great War. Colonel Slifer was commissioned as Major E. O. R. C. on August 15, 1917, and was assigned to active duty with the 311th Engineers at Camp Grant, Rockford, Ill., September 12. On September 20 he was transferred to the 21st Engineers, Light Railway, with which regiment he was connected until the time of his death. On September 28, 1917, he was commissioned Lieut.-Colonel, Engineers, N. A.

"During the two months that this regiment was at Camp Grant he took charge of the picking of the special trained men for the work which this regiment was to do and ably assisted Col. E. D. Peek, regimental commander, in perfecting the organization of the regiment. He left the states with the regiment and arrived in France on January 10, 1918, and proceeded to Challuy (Nievre), near Nevers, France, where regimental headquarters were established. During the few weeks that he was located at this place he assisted in the preparation for construction of important works in this vicinity.

"On February 27 he proceeded with the regiment to Sorcy (Meuse), where he was located until July. It was here that Col. Slifer's experience and ability was to come into play. Sorcy was designated to be made into an important railhead for the American troops, which occupied the Toul Sector. It also was the headquarters of the American light railways in the Advance Zone. In April Col. Slifer was made chief engineer of the light railways, 21st Engineers, and inaugurated plans of construction, maintenance and operation which later proved to be of inestimable value.

"During the month of July, Col. Slifer was engaged in superintending and planning a light railway system to serve the American sector to the south of Luneville. Upon completion of this work he returned to Sorcy to find that preparations were in progress for an action which was afterward known as the St. Mihiel offensive. During the period of preparation Col. Slifer was at his office or in the field every day, working from 12 to 18 hr. out of the 24.

"After the close of the St. Mihiel offensive Col. Slifer was ordered to Vraincourt, Meuse, northwest of Verdun, with the regiment where they took station on October 12. At that time the light railways of that sector were in a deplorable condition and practically no service was being rendered to the combatant troops. By November 1 an immense amount of work had been done on the light railways and the ammunition and rations were being placed within one mile of the front on the Meuse-Ar-

gonne sector. On November 1, the date of the beginning of the final drive, Col. Slifer spent several hours visiting the various detachments which were working under shell fire and encouraged and helped them very materially. During the period from November 1 to November 13 he was constantly with his men under the most trying and dangerous conditions, and it was due primarily to him that the Services of Supply bore up under the strain in the Advance Zone. On November 13, while traveling on a light railway motor which was derailed, his arm was broken. He was taken to a near-by hospital and in the course of a few days evacuated to a base hospital, where he developed pneumonia. Upon his partial recovery from this sickness, he was evacuated to a hospital at Cannes (Mediterranean), where he rapidly recovered his strength. In the middle of January a medical board decided that he be sent home, as it was considered that he would be unable to stand the work under the trying climate where his regiment was located.

"In order to say good-bye to his men, he made a trip to Conflans (Meurthe et Moselle), where he arrived January 31; and on February 2 he started to Bordeaux. Upon arriving at Neufchateau (Vosges) his condition was such that the doctor ordered him to a hospital, where it was found that he had pneumonia a second time. Due to his enfeebled condition, he was unable to survive the second attack, and expired in one of the base hospitals on February 3. On February 5 he was buried at the American Cemetery near Sorcy (Meuse) with the rest of the members of his command who had been killed in action, or who had died in France.

"While Col. Slifer had had no previous military training before entering the National army, he was in every respect a soldier. His remarkable ability was of invaluable help in the transportation service of the advance zone. For practically eight months he lived within 10 miles of the front and spent considerable time within one or two miles of "No Man's Land." It is probable that no commanding officer of any unit in the A. E. F. was more respected or beloved by his officers and men than Col. Slifer. His loss is felt most keenly by all, and the Army lost the services of one of the finest types of Americans.

"(Signed) M. E. PUMPHREY,
"Captain Engineers, U. S. A."

Col. Slifer was one of the earliest members of the A. R. E. A., being the twenty-first member. He had been active in its work throughout its history and was a member of the Committee on Economics of Railway Labor at the time of his death.

An Inspection of Steel Ties

The Tri-City Steel Tie Corporation, St. Louis, is arranging to conduct a party to inspect an installation of 306 of its ties in a high speed main track of the Chicago & Alton, at Robey St., Chicago, leaving the Van Buren St. Station of the Illinois Central at 12:15 today. These ties were installed on this track over three years ago and an opportunity is now afforded to inspect them after this exacting service. The party will return to Van Buren St. by 1 o'clock. All interested railway men are invited to make this trip.

Many Erie Men Attend Convention

The officers of the Erie have arranged for every division engineer and almost every supervisor on the system to visit the convention and exhibit for at least a day. Half of the division engineers and supervisors were present at the meeting yesterday and the remainder will come to-day.

New Committee Chairmen of the A. R. E. A.

Only five of the 22 regular and 2 special committees of the American Railway Engineering Association have been under the leadership of new chairmen during the past year. In the case of one of these, the Committee on Track, the present chairman, W. P. Wiltsee, is completing the unexpired portion of the term of John R. Leighty, the regular chairman, appointed last spring, and who resigned during the year. Mr. Wiltsee was vice-chairman previously. He has taken an active interest in track

George J. Ray, the new chairman of the Committee on Rail, is essentially a student and one of his particular hobbies is improvement in the quality of rail. Consequently his selection as chairman of this important committee is a logical one. As chief engineer of the Delaware, Lackawanna & Western, he has been responsible for a large amount of constructive work in the study of rail wear and rail failures. One practice in particular for which he is responsible on that road is the segregation of



W. H. Hoyt
W. P. Wiltsee

G. J. Ray
B. H. Mann

W. H. Finley
C. M. Taylor

New Committee Chairmen of the A. R. E. A.

work on the Norfolk & Western, on which road he is assistant to the chief engineer. His interest to track matters extends to the Roadmasters' and Maintenance of Way Association, in which he has taken an active part for some time. During the last two years he has served as an officer in that organization. Mr. Wiltsee has given considerable time to original studies of track matters, one of which has been to arrive at an analytical determination of rail renewals through measurements of rail wear.

the rails laid in the track according to heats, so that it is possible to keep a careful history of each heat of rails rolled for this road. Under his supervision the Lackawanna has been a pioneer in the use of screw spikes and heavy tie plates, his studies along this line having been the subject of an important bulletin published by the association. Although track matters seem to have taken a very large part of his attention, Mr. Ray commands no little distinction as the chief engineer of the Lackawanna during the inception, prosecution and completion of the

world famous Tunkhannock viaduct. At the present time he is on leave of absence in order to serve as engineering assistant to the director of the Eastern region. Aside from the important part he has taken in association committee work, he has served a term as director.

The appointment of C. M. Taylor as chairman of the Committee on Wood Preservation is another illustration of the close co-operation between the American Railway Engineering Association and other organizations specializing in different branches of work carried on by this Association. Mr. Taylor has been an active and valuable member of the American Wood Preservers' Association for a number of years, being one of its vice-presidents at the present time. His position as superintendent of treating plants for the Central Railroad of New Jersey and the Philadelphia & Reading at Port Reading, N. J., makes him eminently fit for leadership of the Committee on Wood Preservation at a time when that industry is passing through a marked transition.

The Committee on Yards and Terminals is headed this year by B. H. Mann, signal engineer of the Missouri Pacific. While his training has been largely along the line of signaling his railroad experience has been so varied, covering Eastern and Western roads both large and small, and he has always been given to studying his problems from a broad viewpoint, that he is in fact well chosen for leadership of this committee. He has, however, taken a very active interest in signal matters, having served as a member of the Railway Signal Association of which he was president in 1912.

The chairmanship of the rather prosaic Committee on Rules and Organization is held this year by W. H. Finley, formerly chief engineer of the Chicago & North Western, and now president of the corporate organization of that road. Mr. Finley's interests are varied and this is only one of a large number of activities in which he plays an important part.

The new chairman of the Committee on Wooden Bridges and Trestles is W. H. Hoyt, who succeeds to the leadership of the committee from the position of vice-chairman. He is assistant chief engineer of the Duluth, Missabe & Northern, where he has had an opportunity to obtain an extended experience in trestle work in connection with the design, construction and maintenance of large ore docks. Mr. Hoyt is an active member of the association, but his interest in engineering society matters is not restricted to this body, since he is also active in the work of the Duluth engineering societies.

Orders for Steel Rails in Prospect

The committee representing the steel manufacturers will hold a conference in Washington on Wednesday with the Industrial Board of the Department of Commerce, which is seeking the co-operation of the industries in an effort to readjust prices. If a satisfactory price is agreed upon, the Railroad Administration will place an initial order for 500,000 tons of rails. Steel companies have already offered a reduction of \$5 under the prices set last year—\$55 for Bessemer and \$57 for open hearth—but the Railroad Administration wants lower prices.

Director-General Hines held a conference in New York on Monday with the regional directors and also with some of the bankers regarding the plans for financing the Railroad Administration's debts to the railroad companies. A further conference will be held with the railway executives in Washington when the director-general is expected to announce definitely the plan for issuing warrants for part of the amounts due to the railroad companies.

A. R. E. A. Registration

The following is the registration of the members and guests at the convention of the American Railway Engineering Association on yesterday, the opening day:

Members

Abbott, F. E., Insp. Eng., Lackawanna Steel Co., Buffalo, N. Y.
 Allen, L. J., Ch. Eng., Ann Arbor R. R. Co., Owosso, Mich.
 Ambrose, J. R. W., Chief Eng., Toronto Term. Ry., Toronto, Ont., Canada.
 Ames, Azel (in military service).
 Angerer, Victor, Pres. Wm. Wharton Jr. & Co., Inc., Easton, Pa.
 Angier, F. J., Supt. Tim. Pres., B. & O. R. R., Baltimore.
 Armour, Robert, Mas. Eng., Grand Trunk Ry., Montreal, Can.
 Armstrong, H. J., Asso. Prof. C. E., Armour Inst., Chicago, Ill.
 Atwood, J. A. (Director), Chief Eng., P. & L. E. R. R., Pittsburgh, Pa.
 Auten, J. C., Prin. Asst. Eng., Penna. R. R., Wilmington, Del.
 Bailey, A. R., Asst. Prof., Univ. of Mich., Ann Arbor, Mich.
 Baldridge, C. W., Asst. Eng., A. T. & S. F. Ry., Chicago.
 Baldwin, A. S. (Past-President), Vice-Pres., I. C. R. R. Co., Chicago.
 Baldwin, Hadley, Asst. Ch. Eng., C. C. C. & St. L. Ry., Cincinnati, O.
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- Talbot, A. N., Prof. Mun. & San. Engr., U. of Ill., Urbana, Ill.
- Taylor, C. M., Supt. Creos. Plant, Phila. & Reading Ry., C. R. R. of N. J., Port Reading, N. J.
- Taylor, E. B., Jr., Div. Engr., Penna. Lines, Pittsburgh, Pa.
- Taylor, F. J., Div. Engr., Nor. Pac. Ry., Livingston, Mont.
- Temple, E. B., Eng. Asst. to Reg. Dir., Allegheny Region, U. S. R. A., Philadelphia, Pa.
- Temple, H. H., Ch. Eng., P. & W. Va. Ry., Pittsburgh, Pa.
- Thompson, F. L., Ch. Eng., I. C. R. R., Chicago.
- Thrower, D. W., Val. Eng., I. C. R. R., Chicago.
- Tratman, E. E. R., Wheaton, Ill.
- Trenholm, J. B., Eng. Roadway, A. C. L., Rocky Mount, N. C.
- Trimble, Robert (Past-President), Ch. Eng. Constr., Pennsylvania Lines, Pittsburgh, Pa.
- Turner, W. F., Div. Eng., Sou. Pac. Co., Ogden, Utah.
- Turneure, F. E., Dean, Col. of Engr., Univ. of Wis., Madison.
- Unger, J. S., Man. Research Lab., Carnegie Steel Co., Duquesne, Pa.
- Van Auker, A. M., Cost Eng., Val. Dept., C. B. & Q., Chicago.
- Van Auker, K. L., Chicago, Ill.
- Vandersluis, W. M. (In Military Service).
- Wagner, S. T., Ch. Eng. for Corp., P. & R. Ry., Philadelphia, Pa.
- Walker, William, Act. Div. Eng., Grand Trunk Ry., Montreal.
- Wallace, W. A., Division Eng., Rock Island Lines, Eldon, Mo.
- Walter, J. W., Shattuck, Okla.
- Warden, R. E., Asst. Eng., M. P. R. R., Little Rock, Ark.
- Warren, W. D., Eng. Lines East, New Haven R. R., Boston.
- Welty, H. T., Eng. of Struct., N. Y. C. R. R., New York, N. Y.
- Wendt, Edwin F. (Past-President), Member Eng. Board, Bureau of Valuation, Interstate Commerce Commission, Washington, D. C.
- Wheeler, F. S., Div. Eng., Erie R. R., Buffalo, N. Y.
- Wickhorst, M. H., Eng. of Tests, Rail Committee, Chicago.

Wilkinson, J. W., Office Eng., N. Y. C. & St. L. R. R., Cleveland.
 Williams, A. P., Div. Eng., B. & O. R. R., Connellsville, Pa.
 Williams, C. C., Prof. of Ry. Eng., Univ. of Kansas, Lawrence, Kan.
 Williams, W. D., Ch. Eng., C. N. R. R., Van Wert, O.
 Willoughby, J. E., Ch. Eng., A. C. L., Wilmington, N. C.
 Wilson, A. O., Div. Eng., S. A. L., Charleston, S. C.
 Wiltsee, W. P., Asst. to Ch. Eng., N. & W. Ry., Roanoke, Va.
 Wirth, A. A., Supr. Eng., Penna. Lines, Pittsburgh, Pa.
 Wishart, J. G., Office Eng., C. R. I. & P. Ry., Chicago.
 Woodruff, R. E., Supt. Trans., Erie R. R., Youngstown, O.
 Worthing, E. E., Sig. Eng., Sou. Pac. Co., Houston, Tex.
 Yager, Louis, Eng. M. of Way, N. P. Ry., St. Paul, Minn.
 Yates, J. J., Bridge Eng., Central R. R. of N. J., New York City.
 Young, D. R., Asst. Eng., D. L. & W. R. R., Buffalo, N. Y.
 Young, R. C., Ch. Eng., L. S. & I. and Munising Rys., Marquette, Mich.

Guests

Allen, G. H., London.
 Anderson, P. E., U. P. Ry., Pasco, Wis.
 Batts, A. E., Dist. Eng., C. & O. Ry., Huntington, W. Va.
 Bebbs, J. E., Asst. Bridge Engr., M. C., Detroit, Mich.
 Benson, G. L., Superv., Erie R. R., Kent, Ohio.
 Bishop, F. J., Marquette, Mich.
 Bronson, C. B., M. E., N. Y. C. R. R., New York.
 Brown, G. H., P. R. R., Altoona, Pa.
 Boehm, A. J., Youngstown, Ohio.
 Boehme, A. J., Youngstown, O.
 Bohn, W. C., Pilot Engr., B. & O., G. C. Sta., Chicago.
 Boone, J. E., St. Louis, Mo.
 Borland, W. P., Interstate Com. Com., Washington, D. C.
 Boyd, Jas. K., Wilkesburg, Pa.
 Brownson, C. B., N. Y. C., New York, N. Y.
 Buell, D. C., Lt. Comdr., Ry. Educational Bu., Omaha, Neb.
 Buzick, J. W., Conley Frog & Switch Co., Memphis, Tenn.
 Cameron, A. B., Superv. Sig. Dept., Soo Line, Superior, Wis.
 Chevalier, C. R., Roadmaster, Portland Term., Portland, Me.
 Christan, W. T., Chicago.
 Clough, A. M., N. Y. Cent., Batavia, N. Y.
 Cochrane, R. L., Chief Clerk, Chief Eng. Sys., A. T. & S. F. R. R., Chicago, Ill.
 Coderre, J. H., in charge Wood Preservation, Forest Prod. Lab. of Canada, Montreal.
 Copeland, R. D., Asst. Eng., Wabash R. R., Moberly, Mo.
 Copeland, G. B., Asst. Eng., A. C. L. R. R., Rocky Mountain, N. C.
 Croyenolly, W. H., Superv., Erie R. R., Wellsville, N. Y.
 Curtis, Allen, B. & A. R. R., Worcester, Mass.
 Disbrow, C. A., Rail Joint Co., N. Y. C.
 Dodd, E. B., Sig. Superv., Soo Line, Minneapolis, Minn.
 Eddington, C. R., Galesburg, Ia.
 Elliot, H. S., Erie R. R., Marion, Ohio.
 Flynn, W. J., Superv., Erie R. R., Elmira, N. Y.
 Fitzpatrick, R., Res. Eng., Erie R. R., Buffalo, N. Y.
 Foley, J. J., Superv. of Track, G. T. R. R., Portland, Me.
 Freygang, C. M., B. & O., Cincinnati, O.
 Frill, G. H., G. T. R., Belleville, Ontario.
 Frith, G. H., Grand Trunk, Belleville, Ont.
 Fitzsimmons, W. E., Fargo, N. D.
 Gibson, James M., Supt. B. & B. Dept., G. T. R. R., Portland, Me.
 Grills, A., Genl. Roadmaster, G. T. R. R., St. Thomas, Can.
 Gongall, O. C., Asst. Supt., B. & B.-Soo Line, Minneapolis, Minn.
 Goos, Julius H., Insp. Eng., G. N. Ry., St. Paul, Minn.
 Gordon, H. G., Secy. to Ch. Engr., G. T. Ry., Montréal.
 Gutelius, F. P., Jr., Asst. Engr., D. & H., Albany, N. Y.
 Gutelius, Wm., Jr., Asst. Engr., D. & H., Albany, N. Y.
 Hall, F. D., B. & M. R. R., Boston, Mass.
 Hall, T. D., Boston & Maine, Boston, Mass.
 Hanley, Thos. L., Chief Eng., Indianapolis Switch & Frog Co., Springfield, Ohio.
 Harris, J. H., P. A. E., P. R. R., N. Y. C.
 Holden, U. S., Field Eng., B. & O., Baltimore, Md.
 Hood, J. M., A. Coy. Ry., Akron, Ohio.
 Hyle, A. W., St. Louis.
 Insley, H. H., Columbus, O.
 Johnson, John, N. Y. C., Newburgh, N. Y.
 Johnson, Paul H., Asst. Engr., C. I. & N. Ry.
 Keggan, J. J., M. C., Erie R. R., Marion, Ohio.
 Keig, J. R., Chief Treatment Insp. Cent. West. Reg., Purchasing Com., U. S. R. R. A., Chicago.
 Kauffman, H. H., Reading, Pa.
 Kerr, H. H., V. P., Westinghouse Church, Kerr & Co., Chi.
 Klumpp, G. J., N. Y. C., Rochester, N. Y.
 Kowal, Joseph, Roadmaster, N. P. Ry., Washington.

Land, Bennett, Jr., Div. Eng., S. A. L. Ry., Plant City, Fla.
 Lees, Thos., C. P. R., Winnipeg.
 Lichty, C. A., Genl. Insp., C. & N. W., Chicago.
 Lowe, J. D., Roadmaster, S. P. R. R. Co., Sierra Blanca, Tex.
 Lyers, Wm. J., Supr., B. & B., Belleville, Canada.
 MacArthur, F. E., Sup. Sig., C. V. R. R., St. Albans, Vt.
 McAelerius, M. B., C. R. I. & P. R. R., Tishoming, Okla.
 McKean, J. V., East Tarvas.
 Melhoare, F. B., Chicago.
 Miller, W. F., Supr. No. 1, P. R. R., W. Philadelphia, Pa.
 Morell, Max, Toronto, Canada.
 Moscrip, A. L., France Stone Co., Toledo, O.
 Nagel, J. R., Genl. Roadmaster, Mo. Pac. R. R., Nevada, Mo.
 Nolte, C. B., Robt. W. Hunt & Co., Chicago, Ill.
 O'Keefe, Thos., Asst. Eng., B. & A. R. R., Springfield, Mass.
 Pease, B. S., Amer. Steel & Wire Co., Chicago.
 Pepinsky, B., C. C. C. & St. L. Ry., Cincinnati, O.
 Pierce, R., Master Carpenter, Erie R. R., Elmira, N. Y.
 Phelan, P. J., G. T. R. R., Montreal.
 Price, E. C., V. P., Indianapolis S. & F. Co., Springfield, Ohio.
 Puthiam, S. H., B. & O., Chillicothe, O.
 Redding, G. H., Div. Engr., P. R. R., Altoona, Pa.
 Reeves, W. T., Robt. W. Hunt Co., Chicago, Ill.
 Robson, T. B., Roadmaster, L. & N., Evansville, Ind.
 Rodman, Geo. A., Genl. Supt., B. & B., N. Y. N. H. & H. R. R., New Haven, Conn.
 Salisbury, E. F., Asst. Eng., St. L. S. W., Tyler, Tex.
 Sanbourn, H. E., Asst. Superv. B. & B., Boston & Albany, Springfield, Mass.
 Seeburger, F. F., Sig. Insp., C. M. & St. P., Tacoma, Wash.
 Seely, S. A., N. Y. C. R. R., Utica, N. Y.
 Sevatosh, W. R., Res. Engr., Erie R. R., Passaic, N. Y.
 Sexton, J. W., Atlanta, Ga.
 Sheafe, J. S., Pres. Sheafe Engr. Co., Chicago.
 Shely, Wm., Asst. S. B. & B., L. & N., Evansville, Ind.
 Shields, H. A., Roadmaster, L. & N. R. R., Evergreen, Ala.
 Sipple, L., Supt. Track, Erie R. R., Gowanda, N. Y.
 Skellmare, Thos. J., Div. Engr., P. R. R., Jersey City, N. J.
 Smith, A. G., Elec. Eng., Boston & Albany.
 Smith, J. C., Superv., P. R. R., Bedford, Pa.
 Stark, P. W., Roadmaster, L. & N., Evansville, Ind.
 Stoll, H. E., Bethlehem Steel Co., Bethlehem, Pa.
 Streiff, H. F., C. F., Commissioner of Education, Netherlands, East Indies.
 Strobel, Charles L., Chicago.
 Swartz, W. G., Asst. Eng., G. T. Ry., Montreal.
 Swartz, W. G., Asst. Eng., G. T. Ry., Montreal.
 Swartz, H. C., Master B. & B., G. T. Ry., St. Thomas, Ont.
 Swatish, W. K., Passaic, N. J.
 Tayner, F. B., Jos. E. Nelson & Sons.
 Taylor, Thos. B., Amer. Creosoting Co., Louisville, Ky.
 Thrall, W. H., Office Engr., San. Ry., Wash., D. C.
 Tyers, Wm. J., G. T. Ry., Belleville, Canada.
 Valentine, H. S., Supt. Effinger & Russell Co., Jacksonville, Fla.
 Van Auken, A. M., C. B. & Q. Ry., Chicago.
 Vernon, N. D., Supr., P. R. R., Oil City, Pa.
 Walters, H. N., Div. Engr., C. & O. Ry., Covington, Ky.
 Warnsley, Cale, Asst. Engr., C. M. & St. P. Ry., Chicago.
 Webster, J. W., Val. Engr., E. J. & E., Joliet, Ill.
 Weedon, R. E., Supt. Rdy. Shop, So. Ry., Charlotte, N. C.
 Wehner, A. W., Rd. Master, S. P. R. R., Lake Charles, La.
 West, O. R., Asst. Engr., A. T. & S. F., San Francisco, Calif.
 Weymouth, H., Bethlehem Steel Co., Baltimore, Md.
 Weymouth, F. A., Bethlehem Steel Co., Bethlehem, Pa.
 Whitney, T. W., Supr., Blainstown, N. J.
 Wilson, Byron E., Marion, O.
 Wiseman, E. B., Div. Engr., P. R. R., Buffalo, N. Y.
 Winship, L., Sr., Asst. Engr., Mo. Pac., St. Louis, Mo.
 Woemer, A. H., Div. Engr., B. & O. R. R., Wheeling, W. Va.
 Woodbury, W. H., Val. Eogr., D. & I. R. and D. M. & N., Duluth, Minn.
 Work, W., Resident Engr., G. T. R. R., Montreal.
 Wright, W. C., Supr., B. & O., Moundsville, Ala.
 Zeidler, Jno. L., St. Joseph, Mo.
 Zenk, Paul, Youngstown, Ohio.

Miscellaneous

Angier, W. E., Meidjiski & Angier, Chicago, Ill.
 Agers, J. B., Engr. M. of W., So. Ry., Knoxville, Tenn.
 Botts, A. P., Div. Engr., C. & O. Ry., Huntington, W. Va.
 Bishop, F. J., Asst. Engr., L. S. & D. Ry., Marquette, Mich.
 Bone, J. E., Rd. Master, Mo. Pac., St. Louis, Mo.
 Cornell, W. E., Transitman, L. St. L. & W. Ry., Frankfort, Ind.
 Cook, H. H., Div. Engr., St. L. G. & M. Ry., Kingsville, Tex.

Duke, W. D., Richmond, Fredericksburg & Potomac Ry., Richmond, Va.
 Ericson, Chas. D., Mgr. R. W. Hunt & Co.
 Eggers, C. H., Master Carpenter, R. I., Little Rock, Ark.
 Edwards, W. H., Pilot Engr., B. & O. Ry., Wheeling, W. Va.
 Furguson, H., Supt. of Track, G. T. Ry., Toronto, Ont.
 Gardner, E. F., Master Carpenter, Erie Ry., Buffalo, N. Y.
 Gilmore, L. E., Bethlehem, Pa.
 Herndon, R. E., Rd. Master, C. R. I. & P., Little Rock, Ark.
 Hovey, O. E., Hm. Br. Co., New York, N. Y.
 Hockman, H. M., Asst. Engr. M. of W., T. St. L. & W., Frankfort, Ind.
 Hanson, E. S., "Concrete," Chicago.
 Hertzberg, A. L., Dist. Engr., C. P. R., Toronto, Can.
 Inskof, A. H., Hocking Valley, Columbus, O.
 Kirby, K. E., Valuat. Engr., Dallas Terminal, Dallas, Tex.
 Kauffman, H. H., Supvr., P. R. R., Reading, Pa.
 Milhoan, F. B., A. R. M. Co., Chicago.
 Miller, Wm., Supvr., P. R. R., West Philadelphia, Pa.

The Thirteenth Engineers (Railway)

Friends of officers and men in the 13th Engineers (railway), which was organized at Chicago early in 1917 and which includes a number of A. R. E. A. members, will be interested in the following account of the experiences of this regiment and the part it played in the great war. This was prepared from a memorandum written by Major W. G. Arn. The regiment is composed of men from roads running west and south from Chicago.

The 3d Reserve Engineers, afterwards the 13th Engineers (railway), was organized at Chicago and received preliminary training on the Municipal Pier in that city. On arrival in France the regiment was located in Chalons-sur-Marne for one month, where a preliminary study of French track maintenance of way methods was made. In September, 1917, the regiment was transferred to the Second French Army in the Department of the Meuse, with headquarters at Fleury-sur-Aire, to take over the maintenance and operation of the 6 Bis line of military railroad. The maintenance of this line was assumed in a period of very heavy rainfall, which caused a flooding of the Aire and other valleys in the territory covered by the 6 Bis line, and caused numerous washouts.

The 13th Engineers having been organized without track laborers, the French assigned to this service under the 13th Engineers two companies of Indo-Chinese troops from the French province of Tonkin. Being intelligent, these men quickly learned the various features of track maintenance and made an excellent force. They are very sober, industrious and amenable to discipline, but small of stature. The personal and camp cleanliness of these troops was remarkable.

At the time the 13th Engineers took over the 6 Bis line it consisted of a main line 60 kilometers long from Sommeille-Embranchment to Dugny-Grand-Vaux with 13 kilometers from Fleury to Souilly double tracked, and two single track branches, one from Fleury to Clermont-en-Argonne and the other from Souilly to Dombasle. At that time the work of constructing second track from Sommeille-Embranchment to Fleury was under way, this work being handled entirely by the 5th French Engineers.

The amount of railroad construction work in the Second French Army sector having increased to such an extent that the force of the 5th French Engineers in that territory were inadequate for all of the supervision, the 13th Engineers were assigned to take charge, under the direction of Commandant De Lastours of the 5th French Engineers, of some of the work, the labor to be furnished by the French Second Army.

For building an artillery loading and unloading yard at LaCousance, Madagascar negro labor troops of the French Colonial Army were assigned, the work being directed by experienced officers and men of the 13th Engi-

neers. The Madagascar negroes were of very low intelligence, extremely lazy and inefficient. After the work had partially completed the French Army found it necessary to take the Madagascar troops for other service and the job was finished by the band and all men of the 13th who could possibly be spared from other service.

Other construction work of a like nature carried on was the grading and construction of tracks for the ammunition yard at Evres, the grading for a railroad yard at Pierrefitte, the completion of grading for a military railroad between Gimécourt and Pierrefitte, and the erection of a station and camp buildings for the railroad from Loxeville to Pierrefitte.

The grading and track work on that part of the line of railroad from Loxeville to Pierrefitte, which was handled under American supervision, was performed by the Indo-Chinese troops, with the exception of the building erection, which was done exclusively by members of this regiment. At the time the 13th Engineers were asked to take charge of the completion of this work there was no force in the French Army available for the service, so it was decided to transfer the two companies of Indo-Chinese who had been serving on maintenance of way work on the 6 Bis line to this work and replace them on the 6 Bis line with Americans. In the meantime legislation having provided for increased strength in railway regiments, the 13th Engineers was increased to the extent authorized and from the increased force sufficient men were obtained to provide a maintenance force on the 6 Bis line.

During the period of training preliminary to taking over the 6 Bis line the members of the maintenance of way force assisted the French force in repairing cuts in the track caused by enemy shell fire, there being considerable activity of the German artillery and aeroplanes at that period which followed the French attack and advance of the August immediately preceding. During the fall and winter following there was a limited amount of shelling along the line, but in very few cases was the track cut.

The railroad operated and maintained by the 13th Engineers was increased from time to time by the addition of the old lines of the Est Railway from Clermont-en-Argonne to Verdun, from Clermont to St. Menhould, from St. Menhould to the trenches north of Vinne-la-Ville, from Ancemont to Verdun, from Verdun to Conflans, from Ancemont to Lerouville, from Verdun to Sedan, and the 19 Bis military line which, in connection with existing lines of the Est Railway, formed a belt line around the city of Verdun and its suburbs.

Immediately preceding and during the period of the American advance in the territory between the Argonne forest and Verdun the line was cut repeatedly in various places, especially in the Verdun terminal, where there were six separate places that the track was cut in one morning. The general rule in cases of shell fire was that repairs were not made until shelling ceased, except in cases of very urgent need for the track, and in such cases it was necessary to make the repairs under shell fire.

A letter from another member of this regiment, dated Feb. 24 and received last Saturday, indicated that this regiment would be moved from Fleury-sur-Aire about March 15. The record which this regiment has made for itself is indicated by the fact that 9 officers and 22 enlisted men have received the French Croix de Guerre. Since the departure of Col. N. L. Howard recently for America (he arrived in New York on March 12), Major Arn has been in command. Recent press reports indicated that the Thirteenth regiment itself may be expected to return within a few weeks for demobilization after an active service of nearly two years.

Annual Meeting of Appliance Association

President Trees' Address; P. C. Jacobs Is Elected

President; Change Made in By-laws

THE ELEVENTH ANNUAL MEETING of the National Railway Appliances Association was held in the Coliseum at 11 o'clock yesterday morning. M. J. Trees, president of the association, in opening the meeting, spoke briefly of the work of the past year and reviewed the developments of the past year. He said:

President Trees' Address

The eleventh annual exhibition opened with every space filled. This would seem fully to justify the change in the floor plans made last year which gave 31 additional exhibit spaces. The registered attendance, including only those visitors who presented passes or railroad transportation cards at our exhibit on Monday, 1918, was 2,942, and on Monday, 1919, was 3,612. This would seem to indicate a large attendance of railroad men this year.

In further patriotic support of the government, your board of directors during the year authorized the purchase, from the surplus, of \$3,000 Third Liberty Loan Bonds and \$3,000 Fourth Liberty Loan Bonds.

It was decided best that the charge for exhibit spaces for this exhibition should remain the same as last year, notwithstanding the present higher cost of all commodities that enter into a display of this kind. This naturally resulted in absorbing a part of our surplus. In this connection your board of directors, after passing through the uncertain times of the last two years, is of the unanimous opinion that a substantial financial surplus should always be maintained to assure the stability of our organization. Our director of exhibits will explain to you briefly how you, as exhibitors of this association, can help to reduce the operating expenses and thus obviate the necessity of establishing abnormally high rates on exhibit spaces.

It has been suggested that some distinction be made between an exhibiting and a non-exhibiting member of our association. This change would necessitate an amendment to our present constitution and by-laws which is to be presented for such action as you may wish to take.

Our secretary mailed out this year more than 10,000 invitations and passes to railroad men and others who might be interested in our exhibition. The principal reason for using passes is to restrict the attendance as much as possible to those who may have some interest in the products of our exhibitors. In the past there has been some needless expense and duplication in the distribution of passes, due to a few of our members mailing a large number broadcast to lists of railroad men who, no doubt, have already been officially invited and furnished passes by our own secretary.

Invitations were also sent this year to a list of the foreign consuls located in Washington, as well as to a number of foreign commissions who are now traveling in this country studying railroad problems.

In closing, permit me to express to you the appreciation of your board of directors for the earnest co-operation that our members have shown during the past year. I also wish to thank personally the members of the board of directors and our most efficient secretary, Mr. Kelly, for the splendid way they have all worked together in handling the affairs of the association for this exhibition.

Treasurer's Report

C. W. Kelly, the secretary-treasurer, made the following report: While this year will be operated at an esti-

mated loss of \$5,000, it is not unexpected, because while floor space and membership remained the same, the expenditures have been greatly increased in practically every channel. There is a marked advance on labor, on decorations and installation. There were also some exhibits which came in at a late hour which had to be handled on over-time and were further belated due to rainy, bad weather.

With the general high prices which are now in existence and have been during the formation and construction of this exhibition, the treasurer feels gratified indeed to be able to make a report with as little loss as herein indicated.

Secretary's Report

Mr. Kelly also presented a report as secretary of the National Railway Appliances Association, in which he referred to the changes which had been made at the Coliseum this year in the handling of exhibits. He said, in part:

At the time of awarding space, the floor contained, as last year, 267 spaces, of which all were awarded with the exception of some 36. The entire floor plan, however, was filled by January 2. There were a few necessary changes which were occasioned due to business conditions and the floor plan was completely filled, as is now represented on the floor of the exhibition building, about the first of March.

There are at this time 36 non-exhibiting memberships and some 41 requests for space which do not hold either membership or space contracts. This is a very unusual showing to the credit of the association in the light of existing conditions.

We were successful this year in securing the Coliseum building so that we could locate the exhibits and fixtures on Tuesday, March 10, but due to lateness of shipment by a number of exhibitors, together with the lateness of the arrival of Chicago exhibits, there was received at the Coliseum building very few exhibits until Thursday noon, a greater part of these being exhibits which had arrived early and were held in storage for delivery to the Coliseum. The great bulk of our exhibits arrived Saturday morning and up to a late hour Sunday night. This occasioned a great deal of confusion and has been responsible for much additional unnecessary expense.

The enrollment has been carried out exactly along the lines of policies established last year and at noon on Monday we had registered and delivered badges to 65 more of our members than for the total enrollment of last year.

We have inaugurated this year a new style of door pass for checking incoming exhibits, which has been very successful, indeed, in handling the exhibits at the door. We will inaugurate a new exit pass which will allow the exhibitor to give a complete list of his several packages and parcels, and enable him to secure a receipt for his exhibit; and at the same time give to the association an original receipt with an attached coupon which may be used by the exhibitor in case some cartage company should have to call for the exhibit.

The arrangement for bills of lading, both for freight and express, will be handled exactly as heretofore, and the J. M. Taft Cartage Company, as well as the express officials, will occupy the present office of the secretary,

where way bills for both freight and express may be properly filled out.

The secretary feels that the operation of our restaurant this year has been up to the standard of previous years and that the management has tried to render us favorable service. It must, however, be borne in mind that because of the few exhibitions held in the Coliseum this year it was necessary for the catering company to move in every article for this service on short notice.

Report of Director of Exhibits

As director of exhibits Mr. Kelly made a number of suggestions as to how the handling of the exhibits at the Coliseum could be improved. Much trouble is now experienced by the fact that the exhibitors do not ship the exhibits in sufficient time. The bills-of-lading should be sent to the secretary's office and local exhibitors should be more prompt in getting their exhibits to the Coliseum. The delay in shipping the exhibits causes a heavy extra expense in delivering them and setting them up. Much expense could be avoided if exhibitors could study them out carefully in advance and advise the Association as to the exact amount of work that would be required. To improve the appearance of the exhibit it is important that standard signs be adhered to; the height of these should not exceed 5 ft. 4 in.

In closing his report Mr. Kelly directed attention to the fact that the Coliseum must be turned back "broom clean" for other occupancy on Saturday night, March 22. As the exhibit closes at 6 o'clock on Thursday evening, the management will require about one-half hour to remove the columns, floors and wires for electric work, after which the boxes will be furnished and work may proceed in crating as late as the exhibitors care to stay.

Change in By-Laws

The action of the board of directors was approved in making certain changes to the by-laws defining the difference between associate and active members and recommending that the word "active" be inserted at various places in the by-laws. For instance, it is provided that the directors must be active members; active members shall be entitled to one vote; 25 per cent of the active members shall constitute a quorum; and the constitution may be amended by affirmative vote of the majority of all active members.

Article III relating to membership was changed to read as follows:

Section 1. The membership of this association shall be divided into two classes, active members and associate members, who shall be corporations, firms and individuals engaged in the manufacture or sale of railway materials, engineers or contractors engaged in railway construction and publishers of the technical press and others interested in railways.

Section 2. Active membership can only be held by an individual, firm or corporation who has applied for and has been assigned space for the annual exhibition of this association.

3. An associate membership shall have all the rights of members except that of voting and holding office.

Election of Officers

The nominating committee, of which H. C. Holloway was chairman, reported the following nominations for officers; the nominees were unanimously elected: President, P. C. Jacobs, H. W. Johns-Manville Co., Chicago; vice-president, J. B. Strong, Ramapo Iron Works, Hillburn, N. Y.; treasurer, C. W. Kelly, Chicago, Ill.; directors, E. A. Johnson, Duff Mfg. Company, Pittsburgh, Pa.; and Lieutenant Commander G. C. Isbester, Rail Joint Co., Chicago.

A. R. E. A.—A. R. A.

The American Railway Engineering Association is the only one of the seven associations in the railway field which participated in the negotiations leading to the amalgamation of the primary organizations into the American Railroad Association, which still retains its individual identity. At the same time it is cooperating in the organization and work of the newly-formed composite association in every way possible. The fact that this has been accomplished successfully reflects to the credit of the officers of the engineering association who have represented that organization in the negotiations.

The suggestion that the leading organizations in the steam railway field coordinate their activities through one common association is not a new one. Three or four years ago a committee of the American Railway Association approached the American Railway Engineering Association in common with a number of similar societies with a plan leading to their voluntary affiliation with that association, but nothing came of the suggestion. Early last spring, following the passing of the roads under government control, the suggestion was revived and Arthur W. Thompson, acting president of the American Railway Association, called a conference of representatives of seven of the leading railway associations, including the A. R. E. A. and the R. S. A., at which it was stated that the government was favorable to the organization of one central railway association to which it could refer matters for expert information in diversified fields.

Although the American Railway Engineering Association was not the only organization approached on this subject whose membership was individual as contrasted with representative or official constituency, its officers emphasized the fact that they had no power to go into any arrangements which would merge their activities with those of any other association and take away its independence of action without expressed authorization from the members. Accordingly on July 25, C. A. Morse, as president of the American Railway Engineering Association, referred the question of the proposed amalgamation to the members of the society for an expression of opinion. Up to September 5, 1918, when the replies were tabulated, out of 668 replies received 577, or over 87 per cent, voted against the amalgamation, while among the 83 who voted in favor of the measure were several who qualified their votes with the notation "for the duration of the war."

With this expression of the attitude of the membership before it, the board of direction replied to the American Railway Association renewing the suggestion which it had made on May 14, 1918, that the associations now in existence constitute sections of a proposed American Railway Association or Congress; that each section should be responsible for work assigned and should report through its regular officers to the congress; that the congress should be organized with a director representing each section; that the president be either appointed by the Director-General or elected by the boards of direction, and that there be a general secretary of the congress with such assistance as may be necessary. It was further pointed out that as the American Railway Engineering Association is an individual organization, maintained from the dues of its members and from the sale of its publications and therefore self-supporting, no savings to the railway companies would be effected by the proposed amalgamation.

The plan which was suggested is in a general way the one which has been adopted in so far as the American Railway Engineering Association is concerned. In the

meantime the six other associations to whom the question had been presented had expressed their willingness to participate in the proposed amalgamation. As a result the Director-General issued Circular No. 70 on January 10, 1919, creating the American Railroad Association for the period of the war, "to provide a responsible channel through which the Director-General may obtain recommendation for the advancement of railroad practice."

The activities of the other organizations were merged with and made subsidiary to the American Railroad Association by the provisions of this circular. Membership in the amalgamated association is by roads. Active membership is limited to roads under federal control and 100 miles or over in length. A line is entitled to one membership for each 1,000 miles of road or fraction thereof. The American Railroad Association is divided into five sections, operating, engineering, mechanical, traffic and transportation. The engineering section is further subdivided into three divisions, (1) location, construction and maintenance, (2) signalling, (3) electrical working.

Thus officially the American Railway Engineering Association and the engineering section of the American Railroad Association are entirely separate. However, while the engineering section has been organized along the lines of the other sections, the personnel of its officers duplicates that of the American Railway Engineering Association to such an extent as to insure unity of work and to secure for the American Railroad Association the benefit of the united committee and association work of the A. R. E. A.

The by-laws of the American Railroad Association provide that each section shall be governed by a chairman, a vice chairman and a general committee. At a meeting of the engineering section in New York on February 20 a temporary organization was effected to function until the annual meeting of the American Railroad Association in November. At that meeting the following officers were selected: Earl Stimson, superintendent of maintenance, B. & O., chairman; R. E. Trout, signal engineer, S. L.-S. F., vice chairman; members of general committee, H. R. Safford, engineering assistant to regional director, Central Western region; R. E. Parsons, chief engineer, Erie; C. A. Morse, assistant director, division of operation (in charge of maintenance and engineering), U. S. Railroad Administration; C. F. W. Felt, chief engineer, A., T. & S. F.; J. T. Atwood, chief engineer, P. & L. E.; F. P. Patenall, signal engineer, B. & O.; W. H. Elliott, signal engineer, New York Central; George Gibbs, chief engineer electric traction, Long Island, and E. B. Katte, chief engineer electric traction, New York Central. Messrs. Stimson, Safford and Atwood were selected to represent the American Railway Engineering Association; Messrs. Parsons, Morse and Felt to represent the maintenance committee of the American Railway Association; Messrs. Trout, Patenall and Elliott to represent the Railway Signal Association, and Messrs. Gibbs and Katte to represent the Electrical Working Committee of the American Railway Association. Incidentally all of the members of the committee are members of the American Railway Engineering Association.

As an indication of the close cooperation which will exist between the American Railway Engineering Association and the engineering section of the American Railroad Association, E. H. Fritch, secretary of the former organization, will also become secretary of the engineering section of the composite association and will consolidate his office force with that of the larger organization in the Transportation Building, Chicago.

The Chicago Terminal Situation *

One of the important factors contributing to the failure of terminal operations to show the same degree of efficiency that has characterized some of the other departments of railroad operation has been the application of the competitive principle to terminal developments and operations. The railroad systems of our country have been built up on the competitive principle. It was the effort of each railroad company to place itself so that it would be on a parity with its competitors in terminal developments as well as in other matters.

But the application of such a principle as applied to large centers like Chicago falls of its own weight, since it is obvious that each of the railroads cannot secure, maintain and operate adequate terminal facilities in each and every section or district within metropolitan terminal areas where important freight traffic is to be had. The effort to do so has resulted in complications which have increased the cost of terminal operations and in developments which have retarded or placed obstacles in the way of the logical development of the city.

With the entry of our country into the European conflict and the necessity of coordinating all our resources in a manner to obtain a maximum of efficiency, it was early seen that it would be necessary to remedy the very serious condition presented in the competitive operation of our railroads. A sincere effort on the part of the railroads to cooperate on their own initiative was ineffective because of the limitations of existing laws and other conditions. It, therefore, became necessary for the government to take over the operation of the railroads during the emergency.

Theoretically, with all restrictions removed, the government should have been able—so far as existing facilities would permit—to approximate the ideal consolidation of our railroad properties. That this has not been done has been due to many factors, principal of which were the war conditions which had very much disturbed the normal orderly flow of business and traffic.

Nevertheless, out of the temporary control—and in the absence of legislation to the contrary we must assume it is temporary control—has grown a recognition of the desirability of retaining at least those particular features of cooperative operation that are consistent with private control of railroad properties. Certainly today the proposition of applying the cooperative principle to the solution of terminal problems is no longer received as visionary or impractical, and the fact that railroad officers are accepting this principle is in evidence.

From discussions so far published it would seem that the railroads would emerge from the present governmental control under one of the following forms of management:

A. The management of the entire transportation facilities of the country as a unit, somewhat after the manner the railroads are now being operated.

B. The forming of group managements within natural geographic or traffic divisions or regions with or without a central governing board to facilitate interchange between groups.

C. The return to the original individual managements, but with provisions for pooling earnings and expenses—under some form of governmental regulation.

D. The return of the railroads to their individual managements with the pre-war status unchanged.

The alternative treatments of the general transportation problem have been set down above, not in the order of personal preference, but in the order most desirable from the terminal standpoint. The theoretical correct

*Abstract of a paper presented on March 17, 1919, before the Western Society of Engineers by E. J. Noonan, Chief Engineer, Chicago Terminal Commission.

solution of the terminal problem at Chicago in its entirety would only be possible under a condition in which the entire railroad system of the country was being operated as a whole under a central management—form A given above—because only under such a condition would it be possible to exercise control over a shipment from point of origin to point of destination.

By exercising control over a shipment from origin to destination it is possible to consolidate and route shipments so that a minimum of delay will be incurred in intermediary terminals, and in many instances the shipments may be consolidated and routed so as to entirely avoid large congested terminal areas like Chicago. This of course only applies to commodities which are handled in large volume and particularly to shipments originating in the West and Central West and destined to Atlantic Seaboard points. Where such traffic could not be routed around the Chicago terminal, it could be consolidated so that it would pass through the terminal in solid cuts with a minimum of delay. Even with such a method in operation there would still be a vast amount of freight originating in and destined to Chicago which would have to be handled within the terminal district and the proper coordination and interchange of facilities within the terminal district for the handling of this character of freight is a problem of the very greatest importance.

Should the ultimate treatment of our general transportation system take the form of either "B" or "C" outlined above, it would seem that only through the formation of a terminal company or the pooling of all terminal facilities under one management could a solution of the Chicago terminal problem be obtained. Even then, the same theoretical efficiency that would be possible under form "A" could not be obtained. Should the roads be returned to their individual managements on the pre-war status, it is believed that the impetus given to the idea of cooperative terminal operation has been such that the individual railroads will be willing to take advantage of the mutual benefits to be secured in jointly working out terminal developments especially in the more congested districts.

The railroads approach Chicago from all points of the compass except the Lake Michigan side and within the district there are terminal facilities from some twenty-six railroads which enter the district and some thirteen railroads which lie wholly within the district. During the past few years there has been in operation, at the southwest corner of the terminal area, one of the largest freight yards in the country, and the only yard that acts as a clearing between different railroads. This clearing yard is reached by both the Indiana Harbor Belt and the Western Indiana, over either of which it is possible to reach all of the railroads entering the terminal area. Inside these two belts the Chicago Junction Railroad acts as a partial belt for handling traffic to and from the stock yards and the manufacturing district.

It is believed that with these facilities and the existing facilities of the individual railroads there is sufficient trackage if properly coordinated and used efficiently under unified operations to meet immediate requirements for handling carload freight. Future yard developments on the separate lines entering the terminal district should be located along the outer margin of the terminal area and should be planned for an operation that will simplify switching movements and consolidate as much as possible both through freight and freight destined to points within the Chicago terminal.

Less Than Carload Freight

[The speaker described the area and facilities occupied by the railroads for handling L. C. L. freight and re-

ferred particularly to the area between the Union loop and Twelfth street.]

All of the railroad freight houses in this area are of an antiquated type, have practically reached a point where their reconstruction is required in order to afford increased shipping facilities and their operation and construction is such as to cause a maximum of congestion on the streets leading through and to this area. Another thing which impresses one in observing the railroad facilities in this area is the small area occupied by buildings as compared with the great area occupied by tracks. This emphasizes the necessity for a more intensive use of this valuable real estate.

Public interests, shipping interests and economy in railroad operation demand that this entire terminal area be revamped and modern freight house facilities be constructed that will provide adequate shipping facilities that can be operated without undue congestion on the city streets. Such a development would result in a saving in operating costs to the railroads and a utilization of property now superficially occupied. To bring this about it is necessary for the facilities to be constructed and operated along cooperative lines; in fact, it is practically impossible otherwise to bring about the improvement that is necessary in this area.

River Straightening

[The speaker outlined the plan for accomplishing a rearrangement of railroad property in connection with a project for straightening the Chicago River. He also described the progress made in passenger terminal improvements with particular reference to the Illinois Central project.]

Corrections in Report of American

Association of Engineers

In the *Daily Railway Age* of Tuesday, March 18, in the report of the meeting of the American Association of Engineers, J. L. Jacobs, who presented a paper on "Principles and Procedure in Classification of Railroad Engineers," was referred to as being connected with the Curtis Publishing Company. This is wrong; Mr. Jacobs is a consulting industrial engineer with offices in Chicago.

In reporting the remarks of W. W. K. Sparrow on page 658 of the same issue, two paragraphs were omitted, thus making the report incomplete. These paragraphs follow:

I am a railroad man and am speaking, I presume, largely to railroad men and, of course, that is the branch of the profession which, as railroad men, we are most interested in. While urging complete organization of railroad engineers, I do not want anyone to go away with that as the goal in view. A small organization of one section of the profession will not accomplish the desired result. We must have an organization which, when it speaks through its duly elected representatives, will speak for the whole engineering profession of the United States. That voice, gentlemen, will be heard and listened to. We railroad engineers can, however, set the necessary example and strive to organize the railroad section of the National Association in such a manner that it will serve as an incentive to other branches of the profession to do likewise.

The movement of the day appears to be in the direction of organization by classes, and the engineering profession ought to be, and I trust is, alive to the movement. Therefore, let us invite the co-operation of all and use our influence in every direction to build up a National Association which will embrace all branches of the profession and have as its object not only the advancement of tech-

nical research, but the economic, social and political welfare of the profession as a whole.

A Member of the French High Commission

Captain G. Vanneufville of the French High Commission, buyer of railway supplies for all French railways, visited the National Railway Appliances exhibit yesterday afternoon. He is stopping at the Blackstone Hotel and will remain in town for a day or so only. He is accompanied by C. P. Sanburgand, consulting and inspecting engineer of London, and Edward Lee, who is representing Mr. Sanburgand's interests in New York.

New Signal Appointments

C. G. McCauley, formerly supervisor of signals and track for the Washington Terminal Company, Washington, D. C., has been appointed engineer of signal construction on the Jacksonville, Fla., terminals, effective March 1. Mr. McCauley reports to the signal engineer of the terminal company in connection with this construction work.

American Railroad Signal Supervisory

This association held its first annual meeting yesterday in the Elizabethan room of the Congress Hotel. The morning session opened at 10 o'clock with a total registration of 85 members from 28 roads. Among the questions considered were the nomination of officers for 1920 to be elected by letter ballot. The adjustment of the wage situation was discussed in considerable detail with the thought of assisting in straightening out the differences which apparently exist.

Roadmasters Executive Meeting

The executive committee of the Roadmasters and Maintenance of Way Association will meet at the Auditorium hotel at 10 o'clock this morning to discuss the work of the association and to make plans for the convention which will be held in Chicago next September.

Supply Man's Son Received Croix de Guerre

Frank Lepreau, vice-president, Thomas A. Edison, Inc., Primary Battery Division, who is in attendance at the exhibit at the Coliseum, was greatly pleased yesterday to receive word that his son, Sergeant William N. Lepreau, with the U. S. Marines in France, has just been awarded the French Croix de Guerre with two palms. This honor was bestowed by Gen. Petain. The honor is the more unusual because of the fact that the recipient is only 18 years old at the present time.

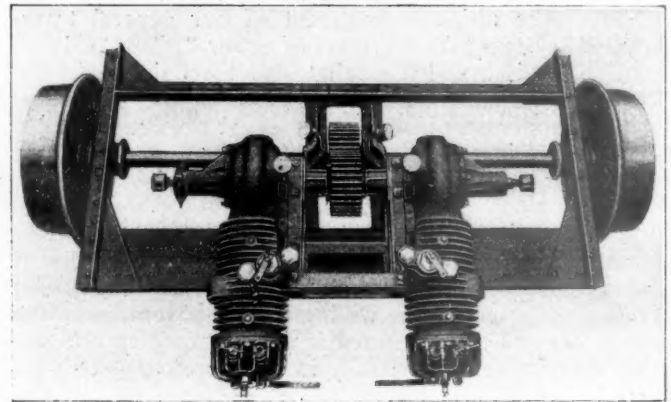
Studying American Technical Universities

H. F. Streiff, a civil engineer from the Dutch East Indies, visited the convention yesterday and was much interested in its activities. He is now engaged in a detailed study of engineering colleges in the United States for his government. Mr. Streiff is a civil engineer graduate of the University of Delft, Holland, who went to the Dutch West Indies on the completion of his college course. After spending five years in the Bureau of Construction of the engineering department of the Government Railways in that country he was made an instructor in civil engineering in the Technical School at Batavia. In 1914 he was appointed director of this college. In March, 1918, the government appointed him to study the advisability of establishing a high grade engineering college. Mr. Streiff was made a member of that com-

mittee and the chairman of a sub-committee on foreign educational affairs. In that capacity he was sent by the governor to the United States, arriving at Seattle on February 10. After visiting the leading engineering universities in the Central West he will visit several colleges in the East and return to his country via San Francisco and the Philippines.

A New Method of Applying Power Plants to Section Motor Cars

Mudge & Co., Chicago, has developed and is using a new method of applying the "E" and "G" power plants in the ES-2 and GS-2 section motor cars, which affords unusual accessibility to the entire power plant. This construction is patented and known as the sub-frame construction. The frame consists of a 6-in. 18-lb. channel in front and a 2-in. by 2-in. by $\frac{1}{4}$ -in. angle in the rear, both of which are riveted to 2-in. by 2-in. by $\frac{1}{4}$ -in. longitudinal angles. At the corners where the cross members join the side members, strength and rigidity have been secured by the use of gusset plates which are riveted to the cross and side members by four $\frac{3}{8}$ -in. rivets in each corner of the forward end and five $\frac{3}{8}$ in. rivets in each



View of the Sub-Frame Construction

corner of the rear. The cast iron base is then bolted to the power plant frame, the entire arrangement being designed so that the greater part of the weight of the engine is carried directly on the channel.

The advantage of this construction is the distribution of the entire load on the Hyatt roller bearings and boxes which are bolted to the longitudinal angles by four bolts in each bearing. This is a safeguard against bending strain on the driving axle. Another advantage is the accessibility to the power plant, as, by removing the six bolts and nuts which attach the power plant frame to the car frame and disconnecting the throttle, timer controls and fuel lines, the cylinders, carburetors, wheel, axles, etc., can all be taken out from under the car in the same manner as a pair of trucks are removed from a box car.

A New Type of Storage Tank

One of the shortcomings of the steel storage tank for the handling of bulk materials such as coal, ashes or sand, is the difficulty of maintaining the plates exposed to the contents since such materials, as a rule, have the effect of abrading the interior surfaces, making it practically impossible to maintain a coat of paint. As a result there is little or no protection against rusting and the life of the plates is considerably less than that of the rest of the structure. To overcome this difficulty the Green

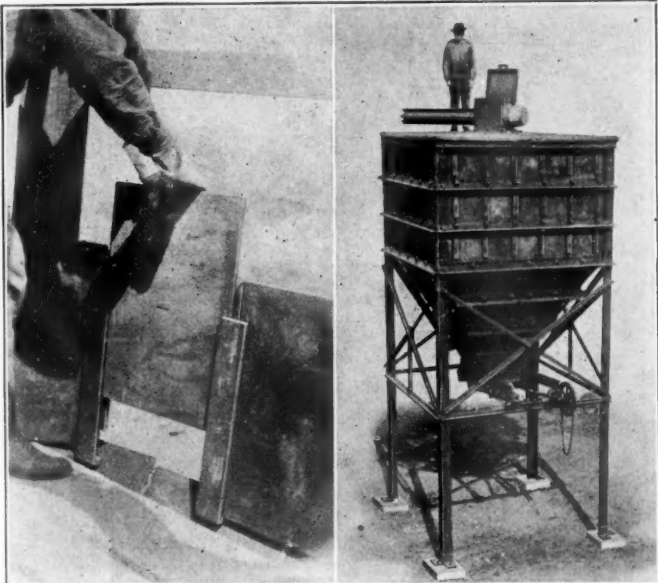
Engineering Company, East Chicago, Ind., has developed a plan for combining structural steel with cast iron whereby the steel is used for the frame or load-carrying members, while the cast iron is applied in the form of plates and other parts that make up the container. By this means the load-carrying ability of structural steel is combined with the greater resistance to corrosion of cast iron. There is also the further advantage that the cast iron



Close View of the Hopper Gate

is used for these portions of the structure, namely, the plates, where in the steel erection is the most difficult. On the other hand, the erection of the simple structural steel angle frame and the assembling of the cast iron members is relatively simple.

The character of the construction and the method of erection are shown in the photographs. Structural steel is used for the tower and for the frame of the tank. Cast iron separators having an H-section are hung at proper intervals on horizontal members of the tank frame and form the vertical supporting members for the cast iron



Assembling the Plates

A Tank Complete

plates which are slid down into the grooves formed by the H-section of these separators. Adequate allowance is made for the horizontal lap of the cast iron plates so that the tank is sufficiently tight to hold common dry materials. The design provides for a cover of similar construction, but this may be omitted if the use to which the tank is put does not make this necessary or desirable.

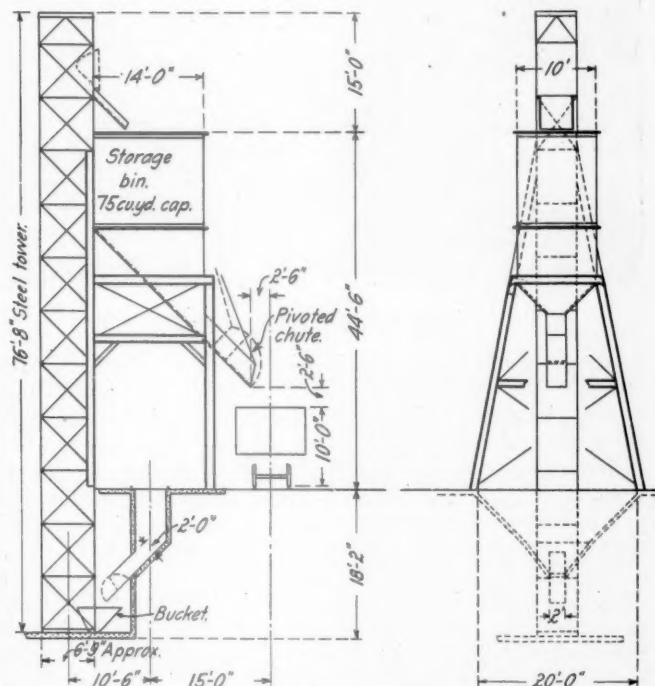
Another feature of this form of construction is the gate provided at the bottom of the hopper. This is also

made so that the parts exposed to the contents of the tank are all of cast iron. It is equipped with an easy rolling slide operated with a rack and pinion from a wheel and chain.

For economy of manufacture and rapid delivery these tanks are made on the standard unit construction basis, but with provision for three sizes—one 9 ft. 8 in. square, one 11 ft. 8 in. square and one 13 ft. 8 in. square. The height of each size may be varied by increments of 2 ft. and provision is made also for combining these unit tanks in batteries, so a large latitude of capacity is available. The lengths of the tower legs may be made to suit the requirements, while the height of the tank may be varied from minimum of 11 ft. for the smallest size to a maximum of 22 ft. 6 in. for the largest size. For railway installations, these tanks have special application for coal bunkers and ash pockets in power plants and for wet sand bins, etc.

Disposing of Locomotive Cinders

One of the most recent developments in engine terminal facilities is the application of equipment used for handling concrete to the disposal of cinders. The Insley Manufacturing Company, Indianapolis, Ind., producers



Side and End Elevation of the Cinder Plant

of towers and spouting for the transportation of concrete, has devised a combination of a track hopper pit with a steel hoisting tower and an overhead storage bin for handling cinders.

The plan provides for a cinder pit about 20 ft. long with a sloping bottom terminating in an opening leading into a hoisting pit of greater depth where a controllable gate is installed to discharge the cinders into a hoist bucket of the Insley roller hoist type. In the installation shown this bucket has a measured capacity of 30 cu. ft. or a net ash capacity of about $\frac{3}{4}$ cu. yd. A steel tower approximately 77 ft. high elevates the ashes to an overhead storage bin of 75 cu. yd. capacity, this bin being carried on a frame the legs of which straddle the pit track. This bin is provided with a suitable gate and a pivoted chute for discharging cinders from the bin into a car on an adjoining track.

An Interesting Application of the Concrete Atomizer

How a waterproof cement mortar may be applied to a leaky masonry surface through which water is seeping under a considerable hydrostatic head is illustrated by the results secured with the concrete atomizer in lining the soffit of a stone arch carrying a double-track line of the Pennsylvania Railroad as well as the Raritan canal over a brook near the passenger station of the Pennsylvania at Trenton, N. J. The situation was so serious as to require the repair work to be undertaken at a time when the government, which was using the canal, found it impossible to shut off the water. In consequence, the work had to be done under the head of water.

The concrete atomizer is a device for the application of



The Arch Soffit with the Concrete in Place

concrete, while in suspension in a stream of superheated steam. The concrete is mixed by means of paddles revolving in a steam-tight drum, from which it is discharged through a piston valve into an adjoining chamber, where it is combined with a blast of steam and discharged through a hose to a nozzle at the point of application. A complete description of this device appeared in the *Railway Age Gazette* of March 19, 1915, page 675.

On the arch at Trenton, the concrete was applied to a thickness varying from four to six inches. No attempt was made to trowel or finish the surface, the finished appearance being as illustrated in the photograph. Owing to the presence of water in the creek it was necessary to conduct the work from a float. A 35-hp. boiler, steaming at about 100 lb. per sq. in., was placed on the bank near the bridge and from this steam pipes were run to the concrete atomizer mounted on the float. Superheating was accomplished by a salamander with a 50-ft. coil of 2-in. double extra heavy pipe. The mode of operation was to apply a jet of steam to a few square feet of the stone surface for a sufficient time to heat the stones to a temperature that would vaporize the water leaking through. As soon as this condition was obtained the hot concrete was jetted on the surface with a pressure of about 50 lb. per sq. in.

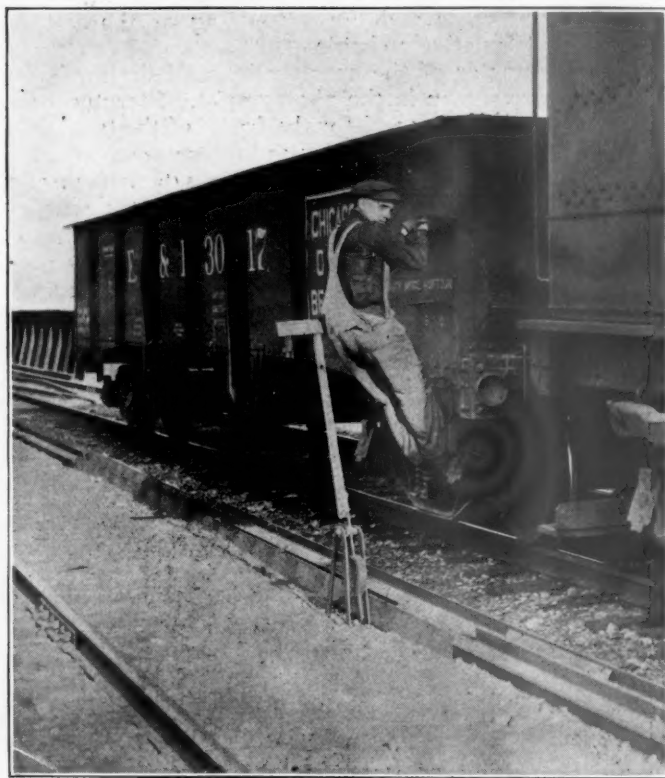
In the course of the work it was found that if the pebbles were omitted from the jetted concrete, the material would not adhere to the surface through which the water was leaking. In other words, the small pebbles hammered the hot mortar into the crevices and checked the flow of water. Before the work was started it was feared that the steam released in the inclosed place un-

der the arch would interfere with the visibility of the work, especially on days when there was no wind, but by inclining the jet toward one end of the arch a current was produced which kept the work in sight of the operator, although it was invisible to bystanders.

One difficulty encountered in the work was that whereas it was intended to use a quick setting cement throughout this work, one shipment of cement received was of a kind that refused to set under the conditions imposed. This caused considerable trouble for some time. Other difficulties encountered in the conduct of this work included several rises of the creek level to such an extent as to submerge the float. Many stones in the arch had a vitreous surface of great smoothness, but this did not prevent the mortar from adhering and the work has been made waterproof except at the opening in the arch near the south end where an outlet had been provided for emptying the canal. All of the work was done by Harold P. Brown, New York, who was the originator of the concrete atomizer.

A New Side Clearance Telltale

THE SIDE CLEARANCE telltale shown in the illustration has been in use on the Elgin, Joliet & Eastern for some time as a medium for warning trainmen and others, who happen to be on the sides of cars, of obstructions between or at the side of tracks. This device,



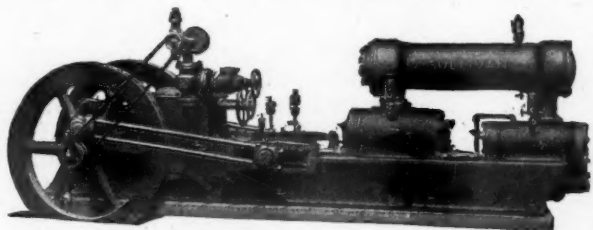
A New Side Clearance Telltale

which is manufactured and sold by Gifford & Co. of Chicago, consists of a vertical staff, at the top end of which are two flexible blades, similar to those used on dwarf signals, fastened at right angles to the staff. The staff is mounted on a metal frame, which serves as a base and also as a fulcrum, from which the staff swings like a pendulum. That portion of the staff above the stand consists of wood, while the part below is a metal bar provided with a counterweight which holds the staff normally, in the vertical position. This counterweight is adjustable so as to permit a variation in the swinging

qualities of the telltale to meet the requirements of the purchaser. This telltale can be used to give warning of the presence of bridges, girders, elevators, coal sheds and other obstructions, portions of which come within the clearance line formed by men hanging on the sides of cars. The flexible blades are intended to be of the same length as the portion of the obstruction within the clearance line; so that a man hanging on the side of a car will hit the blade. If his body comes in contact with the staff it will be deflected toward the horizontal, but will immediately assume the vertical position as soon as it is clear from contact with the man.

Recent Improvements in Air Compressors

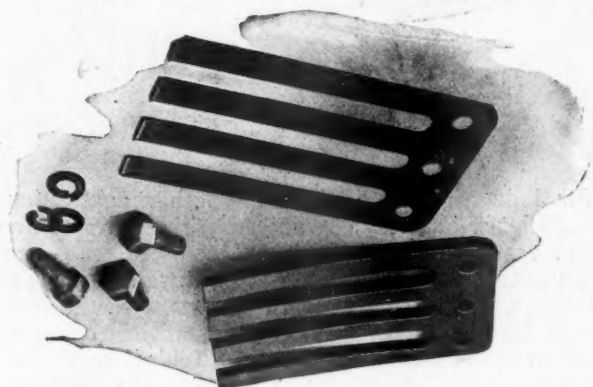
The large photograph shows a new model of steam-operated air compressor of a type applicable to installations supplying air to air-lift pumps, locomotive sanding plants, cinder conveyors, train charging pipe lines and other purposes for which a permanent installation is applicable. It was developed from an earlier type through the introduction of a number of improvements and the



The Type WB-3 Air Compressor

application of some new features. It is of the straight-line type with a single steam cylinder and two air cylinders for two-stage compression and is suitable for air consumptions ranging from 400 to 940 cu. ft. of free air per min. compressed to a maximum pressure of 100 lb. per sq. in.

One of the new features is a speed and pressure governor providing for three adjustments, namely, maximum speed, minimum speed and air pressure, each inde-



The Sullivan End Rolling Finger Valve and Guard

pendent of the other. The speed-controlling element is inclosed in a casing to protect it from dirt.

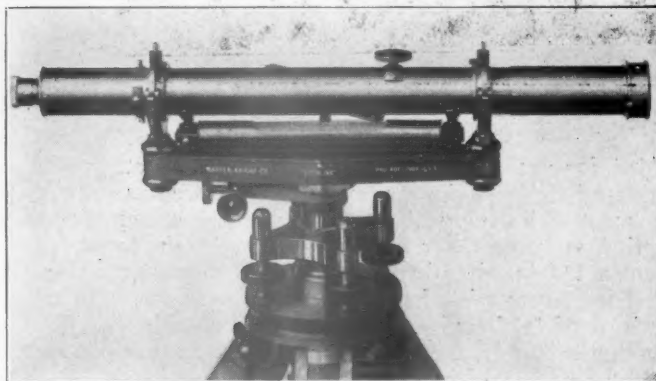
Another new application is the use of "end-rolling finger valves," as shown in the smaller photograph. The valves, which are in the air cylinder heads, consist of thin flat steel sheets cut to form four finger-like blades. These are bolted to the cylinder heads so that the fingers take seats over long, narrow ports, the ports being opened or closed according to whether the fingers are laid flat against the seats or bent backward away from them. To

protect the valves and prevent excessive lifting from the seats they are covered by steel guards having the same general shape as the valves, but made of a thicker material and given a definite curve away from the valve seat. In opening, the fingers impinge against these guards with a sort of rolling motion from which the name, "rolling finger valve," was derived. Advantages ascribed to these valves include rapidity of action, wide port opening with minimum wire drawing and a reduction in the number of moving parts. The end rolling effect also eliminates the hammering or slapping commonly occurring in the operation of air valves.

These pumps are made in two sizes, one with 12-in. by 14-in. steam cylinders and the other with 16-in. by 16-in. steam cylinders. They are designed to operate to a maximum air pressure of 100 lb. per sq. in. with an ample factor of safety for a steam pressure of 150 lb. per sq. in. The compressors are known as the "Sullivan WB-3" air compressors manufactured by the Sullivan Machinery Company, Chicago.

A Wye Level With New Accessories

Engineers who at some time in their experience have done any appreciable amount of surveying have developed certain well defined ideas on the requirements of surveying instruments for accurate and efficient work. Aside from the necessary refinement of construction, a matter wherein the user is dependent on the reputation of the maker, the accuracy of the instrument is dependent on certain features which are readily subject to the buyer's observation, while the facility with which the instrument may be used in accomplishing rapid work is contingent in a measure upon certain accessories developed from time to time or upon the methods by which these accessories are applied to the instrument. For this rea-



The Sterling Model 16M Level

son a description (or what is commonly termed the 'specifications') of an instrument are always matters of considerable interest to men who have used levels or transits or are responsible for their use by others.

The Sterling engineer's wye level, Model 16M, recently developed by the Warren-Knight Company, Philadelphia, embodies a number of features which warrant a rather detailed account of the specifications. The improvements consist in the use of a hardened steel center fitted in a socket of annealed iron, secured to a ribbed level bar of hard bronze. The leveling screws are fitted into replaceable bushings, the leveling head being so designed as to insure an absolutely non-cramping center.

The telescope is set low in the wyes, and the entire instrument is said to be extremely rigid and well balanced. The reflecting mirror on the far side of the telescope, shown in the illustration, may be detached or used on

either the right or left side of the instrument, as desired. The focusing slide and eyepiece are provided with dust guards and the telescope collars are of hard bell metal. A new type of lock screw for securing wye clips is used, and the clamp and tangent screws rotate with the level bar and are always in the same relative position to the operator.

A Pneumatic Rivet Cutter

"Rivet busting" with a sledge and a cold cut or "buster" will "take the sap out" of a man about as quickly as anything, for it is very hard work. On the other hand, cutting rivets with a chisel bit in a pneumatic riveter is a slow job that has been compared to cutting down a big tree with a hatchet. In other words, there has been a real need for a tool to cut out rivets quickly, cheaply and safely.

One device which lays claim to this distinction is the Red Devil rivet cutter manufactured by the Rice Manufacturing Company, Indianapolis, Ind. This tool is in-



Using the Red Devil Rivet Cutter on Structural Steel Work

tended for removing defective rivets in connection with structural steel erection or repair work as well as for cutting apart old structural steel that is to be saved for re-erection at some other point. This rivet cutter is said to cut a 1¼-in. rivet in 10 sec. and to dispose of ¾-in. and 1-in. rivets with from three to five blows. An air pressure of 90 lb. gives the best results with this tool, although it can, if desired, be used with pressures as low as 40 lb.

The mechanical features of the device are simple. It consists essentially of a cold drawn, seamless tube about 5 ft. long with suitable fittings hydraulically pressed onto it at either end. The rear end is fitted with a valve by means of which air may be admitted into the rear end of the tube, while it is permitted to exhaust from the forward end of the tube through a rubber tube by-pass, or, by giving the valve a quarter turn, the air may be admitted through the by-pass to the forward end of the tube and exhausted from the rear end. The forward end of the tube is equipped with a bushing designed to give a good fit for a chisel bit. The interior of the tube is occupied by a plunger ground to fit the tube with just enough clearance to enable it to slip readily from end to end, yet allowing a minimum of air leakage.

As shown in the photograph, three men are required to operate the cutter. One stands at the forward end to guide the bit while two carry the rear ends by means of suitable handles, one of them manipulating the valve

lever. By replacing the valve in position to admit air to the rear of the tube, the plunger is driven swiftly against the chisel; then if the lever is given a quarter turn, air admitted through the by-pass returns the plunger to the rear end of the tube, while the air behind the plunger escapes through an open port. After a little practice the workman can operate the rivet cutter either fast or slow or strike heavy or light blows. This enables him to give a light blow when the rivet is almost cut off to prevent the head from flying. Springs in each end of the tube absorb all the shock of the plunger other than that given to the chisel, so it is not difficult to hold the device when in use. The rivet cutter weighs 65 lb. in an operating condition and has a total length of 58 in. Under average conditions three men operating the tool are said to cut from 25 to 33 times as many rivets as they could cut in the same time by hand. A smaller tool known as the Baby Devil is manufactured by the same company for use on rivets of 5/8 in. diameter and less, this machine being handled by two men instead of three.

More Efficiency in Lighting Installations

One of the perplexing phases of the gradual introduction of high power illumination since the invention of the electric lamp was the long continued use of shades and reflectors of unscientific design. For many years these devices were constructed with little or no consideration of their efficiency in light distribution or of the detrimental effect upon the eye of the bright glare of the unshaded filaments. But gradually the closer study of illumination resulted in the introduction of lamp fixtures that effected a maximum use of the light available and whereas these principles were first applied only to the more expensive installations, consideration was given eventually to the improvement of fixtures of a type suit-



An Industrolite Fixture

able for industrial installations and other applications where efficiency had to be combined with moderate first cost and economical maintenance.

As an example of a type of lamp fixture adaptable to use in shops, roundhouses, freight houses, etc., the lamp shown in the illustration indicates how efficiency may be obtained in a moderate priced fixture. This is an all-steel porcelain enameled shade design for use with type "C" lamps. It consists of a shade over the lamp having a relatively flat reflecting surface with a guard suspended around the globe to shut off the brilliant glare of the filament. But the light thus intercepted is not lost, since it is reflected either to the shade above or to the working surface below the lamp. The open construction of the fixture also provides ventilation. All of the light from the lamp in a fixture of this kind is directed at angles below 90 deg. This fixture is known as the "Industrolite" and is manufactured by the Luminous Unit Company, St. Louis, Mo.